This magazine is published to promote sound thought upon and concerning industrial medicine and traumatic surgery. To that end it will contain articles, news items, reports, digests and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

Industrial Medicine

Reg. U. S. Pat. Off.

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Hypertension

—in Engine Drivers to Come—

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DURING the past year, in making periodic examinations for the trainmen of the Hudson Division of the New York Central, I have been impressed by the generally high blood pressure readings shown in the examination of the engine crews.

This, among the older men, who came into service before mechanical appliances did away with much of the heavy muscular work, can in part be explained by the heavy arm musculature developed during their days of firing. But the younger men who are working up to take charge of the engines under present conditions do not have that heavy work, and I am finding those men showing higher average blood pressure readings than the other trainmen of the same age group. It is true that the engine crews are still subject to heavier physical duty, but the difference is not so great—not great enough to account for their generally increased pressure readings. My belief is that the increase is due largely to the fact that the engine crews must work at a more intense nervous pitch than the other trainmen or the shopmen.

The men in the engine cab are, from the time they take over their engine for the run until they turn it over to the hostler at the other end, under unusual tension. They must be nervously keyed up to take signals in a flash and be ready to act; they must be alert to sense any sound, jolt or vibration in their engine that is unusual; they must also be able to sense any change in the roadbed over which they pass that indicates danger. It is, of course, true that those men become so accustomed to this that it becomes automatic to a certain degree. Still I do not believe any of them ever become so inured to their work that they can drive at a tension of nervous pitch under which the other trainmen are working.

The increasing demand of the traveling public for more speed will create more tension for the men in the cab. It has been very generally recognized that engine drivers must be limited as to the mileage driven to insure the safety of the trains. So necessary has this limitation been proved that state and Federal laws have been enacted to make it mandatory. The fatigue factor seems to follow the mileage curve rather than that of hours at the throttle. That is, as I see it, the slow run of five hours between two points is no more fatiguing to the engine crew than the express run of three hours between the same points. As express speeds increase we must expect an increase in the tension under which the engine drivers work.

EVOLUTION in man keeps pace with the physical changes in his life and environment produced by new inventions. The natural alteration to meet the increased speed of the present seems to be lagging in the human nervous mechanism. Especially does this seem true of those born in this century in this country. The nervous and mental wreckage in early adult life is appalling, with our psychiatrists and nerve specialists racing in circles in endeavor to correct it.

To me the main cause seems very apparent. In fact it seems so obvious that I believe it is being almost completely overlooked. It is the fatigue of over-long school hours. Worked out in easy equation, which has stood the practical test for years, we have graduated our drug dosage for children. The safe dosage for a child of six is one-third of that for the adult; at 12 years of age it has reached only one-half of the adult average amount. In adult life very careful study has been made of the efficiency of man's work to estimate the number of hours the average individual in a trade can work to the best advantage of himself and his employer. The number of miles that an engineman may drive in a month is fixed by law in some state without much regard to the number of hours of driving duty. We are all willing to accept such ruling; we have been able to prove the wisdom of it. We are also year by year increasing speed, not only in travel, but also in all walks of

life, so that we live under a greater tension than ever before.

What particularly interests all of us who are connected with the railroads is how are the youths of today being trained to take on the more responsible posts of the future, such as engine driving and other posts with our roads, which call for men able to stand up under severe nerve strain.

As railroad physicians we are vitally concerned in the men who must fill the positions of trust where the nervous stress under which they must work is great. Men who can work under high tension without cracking are essential. The training period necessary to fit a man to handle an engine is comparatively long. It is poor economy to train men for such work who will not be able to stand the strain of the job for a period of years. It is part of our duty as physicians to help in the selection of the personnel, so that the wastage from change due to physical disability is kept low.

A casual examination of high school boys, as those boys are coming through today, gives one the impression that the schools of today are turning out a better grade of youth from a physical standpoint than was being done 20 years ago. There are fewer uncorrected physical defects; the average weight and height are greater; the muscle development is more symmetrical. But, what is of great importance to us, the nervous stability is decidedly less. We as physicians even seem to have lost sight of the fact that a weak nervous mechanism may be done up in quite a fine-testing physical package. Our attention has been too intently centered on the proper upbuilding of the body, with too little attention given to the care and development of the directing mechanism of that body. We have been, perhaps, blinded by the old adage that in the healthy body will reside the healthy mind. All of us have had the not-too-pleasant experience of finding that adage untrue in certain of our patients. This is difficult to prove from any of the many statistical tables that have been published. But in the United States I believe the increase in lack of nervous resistance has come so gradually and so uniformly that very few have sensed the seriousness of the present existing condition.

I BELIEVE that a great deal can be done to improve the condition if we can create sufficient sentiment to have our educational leaders accept the findings of those who have so carefully studied the fatigue factor in adult occupations, and properly arrange the school hours so that the child may be given a safe average work-hour week adapted to his age.

I have reviewed medical literature as thoroughly as I have been able in an endeavor to find a suitable working base. I have been unable to find anything scientifically worked out. Working with what small material I have had available, I have come to the conclusion that "Young's Table of Dosage" will give us an excellent guide, for a start at least. All that I can refer to as data indicates this to be very true in the proper arrangement of the school working hours for a child. The equations this table gives are so very different from the usually accepted work-hour schedule of our public schools that it sounds like the vaporings of one demented to say it is unsafe for any school to exceed those hours if that school wishes to turn out the best educated product.

If we accept the artisan's work-hour week as the correct one—(in my rough laboratory tests the fatigue-producing units in the artisan's day correspond most closely to the fatigue units produced by the average school work of our present school system)—from which to figure we get these figures: For a child of six years the proper average school-hour week should be 15 hours; at the age of 12 the average school hours per week should not exceed 22—if we wish to be safe in our hour dosage for the growing child to prevent over fatigue and be sure that the child is being given a full opportunity for building and maintaining proper nervous and mental reserve powers.

In most states the school work-hour week is arbitrarily set at 30 hours. Not with regard to the pupil but rather the teacher, for it has long been established that the mental worker gives the best return to the employer on a six-hour working day basis. The average teacher is very much incensed at any suggestion that might increase the number of the working hours. The pupil who gets so fatigued that he does poor work is frequently punished by the addition of extra tasks, for we, as adults, seem to find it hard to believe that school days are in any way work days to any but the teacher. We seem to be so dumb in this respect that we forget that even pleasurable activities may create over-fatigue.

It seems only logical to expect that the boys who are going through our public schools now, and who later will be coming up for the various posts on our railroad system, will not be able to withstand the demands of those posts which require extra nervous tension unless they arrive at adult life with unimpaired nervous systems.

Any mechanic will tell you that a stiff new engine cannot be speeded up for long without doing serious damage which will impair the engine so that it will never give its full service value. It may look perfectly sound, it may respond to all tests perfectly, until on the road the driver calls for all that that engine is expected to give, and he finds that the reserve he had expected is not there. To me the present educational requirements of our public schools are doing just that sort of thing to the majority of the children whom it is conditioning for life. The system is driving those young human machines at such speed that it is preventing the proper growth and development of the nervous mechanism. Those boys coming into the engine cabs of the future, from the present outlook, will be on surface indications better physical specimens than the past generation, but they will be lacking in that intangible quality of nervous reserve so essential in men who must work under severe nervous tension.

We all recognize the fact that until adulthood

is reached the individual, if of average ability, can not stand long hours of steady work. The actual strength of a lad of 17 may be equal to that of a man 25 but the ability to give daily of that strength through the average working day has not yet been established. One of the most frequent and graphic illustrations of this is given in school athletics. A high school team may be heavy, and as fast as a college team, but that team of high school boys can not stand the playing schedule of the college team. The ambitious coach, coming from a college team playing a heavy schedule, tries to put his charges through an ambitious list of games to find his team has suddenly gone stale in mid-season. Those boys have not built up their reserve force. The rest period between games has not been long enough to replace the reserve expended in match play. If the coach is so unwise as to increase the drive and not give those lads the necessary rest he may do them a lasting injury. With rest the team will shortly swing up into proper shape. This is the sort of thing that I believe our schools are doing to a great number of the pupils passing through them. It is not spectacular, as with the athletic team, for the damage is coming from a slow long-continued fatigue poison.

The poison of fatigue seems to me to act like some of our drugs persistently given in an overdose. While at first there is an apparent partial immunity built up, it has no real substance; and we have individuals trained to take on adult tasks who are fine looking physical specimens, who can deliver for a time in fine shape, but who have not the stamina to carry through as they should. It is as though the response of the eliminatory organs disposing of the fatigue poison indicates that they had become less able to carry out their task because of their over use during the breaking-in process.

I believe that this factor is the dominant one in producing the hypertension among the younger men in posts that require work under increased nervous tension. We all know that the human machine will not wear as long or give as good service where there is such hypertension. We recognize the increased danger to others in having men in the cabs of our engines who show it, for the likelihood of a sudden snapping of a vital link in that individual's anatomy is considerably increased, and no one will be able to tell when such a break is to take place.

THERE is such a tremendous weight of public sentiment to be changed ahead of any general reduction in this burning-out of children through the improper school work-hours, that much damage must be expected from our present method before the general public can be taught to appreciate the danger of fatigue in children from this cause.

I fully realize that I am advocating a change that at first glance will seem preposterous to most, even physicians; and also that I have very little real data that I can present in proof of my contention. But what I have altogether supports my reasoning. We do have very positive data that it is not necessary to have children in school the long prescribed hours for the average child to master the educational work set as a standard.

I present my idea in the hope of arousing sentiment enough to start a careful study of the danger to the future generations of over fatigue in the average, normal, child through persistently overdosing him with school working hours.

Collapse Therapy

—*of Pulmonary Tuberculosis*—

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IT IS, perhaps, needless to say that collapse therapy of pulmonary tuberculosis operates towards a dual objective, the amelioration of the patient's condition and the conversion of the sputum.* While both segments of the objective are important, all public health men today, including ourselves, are inclined to stress the change in sputum status as the more vital issue.

During the past few years there has been a marked change of sentiment in this respect. Toward this change the Municipal Tuberculosis Sanitarium has, we believe, largely contributed. As far back as 1931, the Sanitarium emphasized the preventive aspect of collapse. A bulletin, published that year, rang the changes on the immense potentialities of pneumothorax as a public health instrument, devoted six and one-half pages to consideration of what we called the "social indication" and prophesied a necessarily favorable influence on mortality rates from the widespread use of pneumothorax. I quote from the introduction to the bulletin: "We feel that the diminution in the number of bacilli spreaders must react, inevitably, on the tuberculosis mortality rates. The results may not be apparent in a year or two years. The underlying principles, however, are correct, and time eventually must prove them true."

It is, indeed, gratifying to find that already, within the short period of six years, this prophecy is being realized in fact. Bentley, and others, have shown by comparative studies that collapse exercises a favorable influence on survival rates. In the Bentley studies, 411 collapsed cases followed for a period of five years showed a relative gain of 19.8% in the number alive, as against 3,329 non-collapsed patients checked for a similar period. Of the survivors in both groups, the pneumothorax cases showed 64% quiescent disease as against 38% quiescent disease in the patients conservatively treated.

This result, better survival rates, with its corollary, lessened infection, has been the aim of the Municipal Tuberculosis Sanitarium for the last six years. Lessened infection, a thrust at the extra-

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* Read before the American Association of Railway Surgeons, Chicago, September 20, 1937.

mural open case, has been our special objective. In 1931, when the present board of directors took office, a serious situation confronted Dr. Tice and myself, the members responsible for the medical policies. The Sanitarium was full to the last bed, and we had a waiting list of approximately 600 cases. Cook County Hospital and Oak Forest, the other free institutions, had similar waiting lists. Thirty-five hundred known open cases, and at least as many more unreported, were roaming the streets. The situation of the sanatorium-deprived consumptive was bad; the situation of the public, exposed to continuous infection from thousands of open cases denied institutional care for want of accommodation, was worse. Something had to be done. The magnitude of the problem and the limitation of tax money made sanatorium care of even an appreciable number of patients an Utopia impossible of attainment—in the absence of which certain other methods were considered, aimed particularly at infectious tuberculosis.

As a first measure, a new departure was taken, original, we believe, in the story of medicine. An institution, entitled the Municipal Home for the Open Case, designed to meet the question of the positive sputum patient in contact with children, was started. This institution, with a capacity of 300 beds, failed to answer the problem. The more cases we took into the Sanitarium proper and into the Home, the longer grew our lists, and we still had, approximately, 3,000 known open cases roaming the streets. There was only one recourse left. Since we could not bring the patient to the institution, we thought we should, perhaps, attempt to bring the institution to the patient. On this basis, and impelled by necessity, we undertook the application of widespread pneumothorax in the home and in the extramural clinic.

The advantages of such a course we saw as threefold. In the first place, the field pneumothorax program would materially benefit the Sanitarium proper, accelerate the tempo, and increase the turnover. Patients collapsed at the Sanitarium could be dismissed after a short stay, and passed along for refills to the field organization. In the second place, we anticipated great returns from a comparatively small investment. The patient, who occupied a bed in a sanatorium at a per capita cost of $15 to $20 a week, might be treated acceptably in his home at a relatively very slight cost. In the third place, in pneumothorax we saw a very potent public health instrument whose powers, while theoretically known, had never practically been tested. From figures available in the literature at large, it appeared obvious that a comprehensive plan of collapse was bound to result in a large percentage of positive to negative conversions. It was believed, as stated in our 1931 Bulletin, that we could turn off the "fountains of infection" more expeditiously, more thoroughly, by compressing a diseased lung than by isolating a patient.

In addition to all this, the new directors of the Municipal Tuberculosis Sanitarium found added encouragement in the early experience of one of their number. There was nothing new in the concept of ambulant pneumothorax. As far back as 1898, Dr. Frederick Tice, president of the board, administered pneumothorax therapy to ambulant cases in the Tuberculosis Hospital at Dunning. In those days, Dr. Tice, in association with Dr. John B. Murphy, was accustomed to drain lung abscesses and administer insufflations without the aid of either x-ray or manometer. The two pioneers labored under the further disadvantage that the treatment was a little more than ambulatory. At that time there were no street cars plying to the Dunning institution, and the patients had to ride several miles by omnibus and on bicylces. Notwithstanding these multiple drawbacks, the results were satisfactory. It was reasoned that if field collapse were possible with the facilities of 1898, it should present no difficulties with those of 1931.

In 1931 we had the backing of a 1000-bed Sanitarium, a Sanitarium staff of 38 doctors and 105 nurses, a field staff of 35 doctors and 150 nurses. A joint program embracing large scale collapse, both in the Sanitarium and in the field, was mandatory. It seemed to us that under careful auspices and with proper personnel, such a procedure was fundamentally sound and held promise of great results. As against this promise, what had we to look forward to in the conventional attitude? We were on the horn of the dilemma, and we had to face our alternatives, passivity in a bad situation or an attack along new lines. In other words, collapse therapy, or nothing! Thousands of extramural consumptives were acutely dependent on us and we had only two hands; one held pneumothorax, the other held nothing. Circumstances were pressing. The reply was yes!

A PLAN that gave the deprived consumptive his only chance, and simultaneously enlarged the Sanitarium by increasing the institutional tempo, could not be ignored. With these principles in mind, a joint program of field and Sanitarium collapse was undertaken. To come within range of our objective, we had to meet the following requirements:

1. Close cooperation between the Sanitarium and dispensary units;
2. Widespread application in the field;
3. Continuous and individual supervision;
4. Nursing follow-up in the home;
5. Cooperation of the private physician;
6. Adequate personnel and facilities.

On this broad basis, meeting the proviso of personnel and equipment, by the addition of 10 nurses and three doctors to the dispensary staff, and the transformation of the old Iroquois Hospital to a collapse clinic, we set to work. The plan as first devised is still operative in all its details.

The results achieved have more than justified the effort. At the present time 673 patients in the Sanitarium proper, or 64% of the pulmonary population, are receiving one form or another of collapse. In the field, approximately 1,000 cases are being treated with pneumothorax from the initial injection onward. In addition, the outpatient de-

partment of the Sanitarium is administering refills to 255 patients. In all, then, at the present time, the organization has a total of 1,928 patients under collapse.

In the period under study, from 1931 to 1936, the collapse work in the Sanitarium has increased tremendously, particularly the pneumothorax factor. Thoracoplasties have increased from seven in 1931 to 69 in 1936, phrenicectomies from 54 in 1931 to 159 in 1936, and pneumothorax from 74 in 1931 to 640 in 1936, an increase of 643%.

In evaluating the results, it must be borne in mind that the percentage of minimal cases was relatively small, 3.1%, as against 20.2% in the moderately advanced and 76.7% in the far advanced. In view of the type of disease prevalent and the poor economic status of the patients, the proportion of conversions must be construed as satisfactory.

Meanwhile, what has the dispensary unit been doing? To date, since the field program was started in 1931, 1,798 positive cases have been subjected

	1931	1932	1933	1934	1935	1936	DEATHS
ARTIFICIAL PNEUMOTHORAX	74						NONE
		257					F. 28 TRAUMATIC PUNCTURE L-LUNG. 43rd REFILL - DURING REFILL
			297				NONE
				494			M. 21 TRAUMATIC PUNCTURE L-LUNG. 1st REFILL - 3 HOURS LATER
							F. 31 TRAUMATIC PUNCTURE R-LUNG. 2nd REFILL - SAME DAY
					527		F. 34 TRAUMATIC PUNCTURE R-LUNG. INITIAL TREATMENT - DAY LATER
							M. 17 TRAUMATIC PUNCTURE L-LUNG. 10th REFILL - 4 DAYS LATER
						640	F. 23 TRAUMATIC PUNCTURE L-LUNG. 12th REFILL - 26 DAYS LATER
PHRENICECTOMIES	54	194	214	138	104	159	NONE
INTRAPLEURAL PNEUMO.	1	4	21	24	8	14	NONE
OPEN	0						NONE
		2					M. 19 - 17 DAYS LATER
			21				F. 22 - 4 MONTHS LATER
				23			NONE
					7		F. 29 - 23 DAYS LATER
						14	F. 20 - PLEURAL FISTULA - 5 MONTHS LATER
CLOSED	1						NONE
		2					NONE
			0				NONE
				1			NONE
					1		F. 21 - 11 DAYS LATER
						0	NONE
EXTRAPLEURAL PNEUMO.	0	18	2	0	1	0	NONE
THORACOPLASTIES	7						M. 53 - 12 DAYS AFTER 2nd STAGE
		18					F. 36 - 8 DAYS AFTER 2nd STAGE
			75				M. 35 - 18 DAYS AFTER 2nd STAGE
							F. 21 - 6 MONTHS AFTER 1st ANTERIOR STAGE
							M. 48 - 5 DAYS AFTER 1st STAGE
							F. 43 - 9 DAYS AFTER 2nd STAGE
				46			F. 25 - 4 WEEKS AFTER 3rd STAGE
							M. 32 - 6 WEEKS AFTER 2nd STAGE
							F. 27 - NEXT DAY AFTER 1st STAGE
							F. 38 - 3 WEEKS AFTER 3rd STAGE
							F. 28 - 5 DAYS AFTER RE-OPERATIVE THORACOPLASTY
							F. 24 - 4 DAYS AFTER 1st STAGE
					57		F. 38 - 3 DAYS AFTER 1st STAGE
							F. 30 - 11 DAYS AFTER 2nd STAGE
							M. 31 - 5 WEEKS AFTER 2nd STAGE
							F. 26 - 2 DAYS AFTER 1st STAGE
							M. 40 - 3 DAYS AFTER 2nd STAGE
						69	F. 23 - 23 DAYS AFTER 2nd STAGE
							F. 25 - 6 DAYS AFTER 3rd STAGE
							F. 33 - NEXT DAY AFTER 2nd STAGE
PNEUMONECTOMY						1	M. 44 - 5 DAYS AFTER OPERATION
LOBECTOMY						2	M. 24 - 8 HOURS AFTER OPERATION

Number of Cases and Mortality in Mechanical Trauma

Of the 2,816 patients who received collapse during the period, 673 are still in residence, 1,270 have been discharged and fully studied, 273 have been thrown out due to the fact that the pneumothorax was too short lived to justify conclusion, and 673 are either being traced or subjected to further analysis.

Of the 1,270 fully studied cases, all of whom are discharged, 24% at the time of the study were apparently arrested, 21.6% quiescent, 35% improved, 4.8% unimproved, and 185, or 14.6% dead.

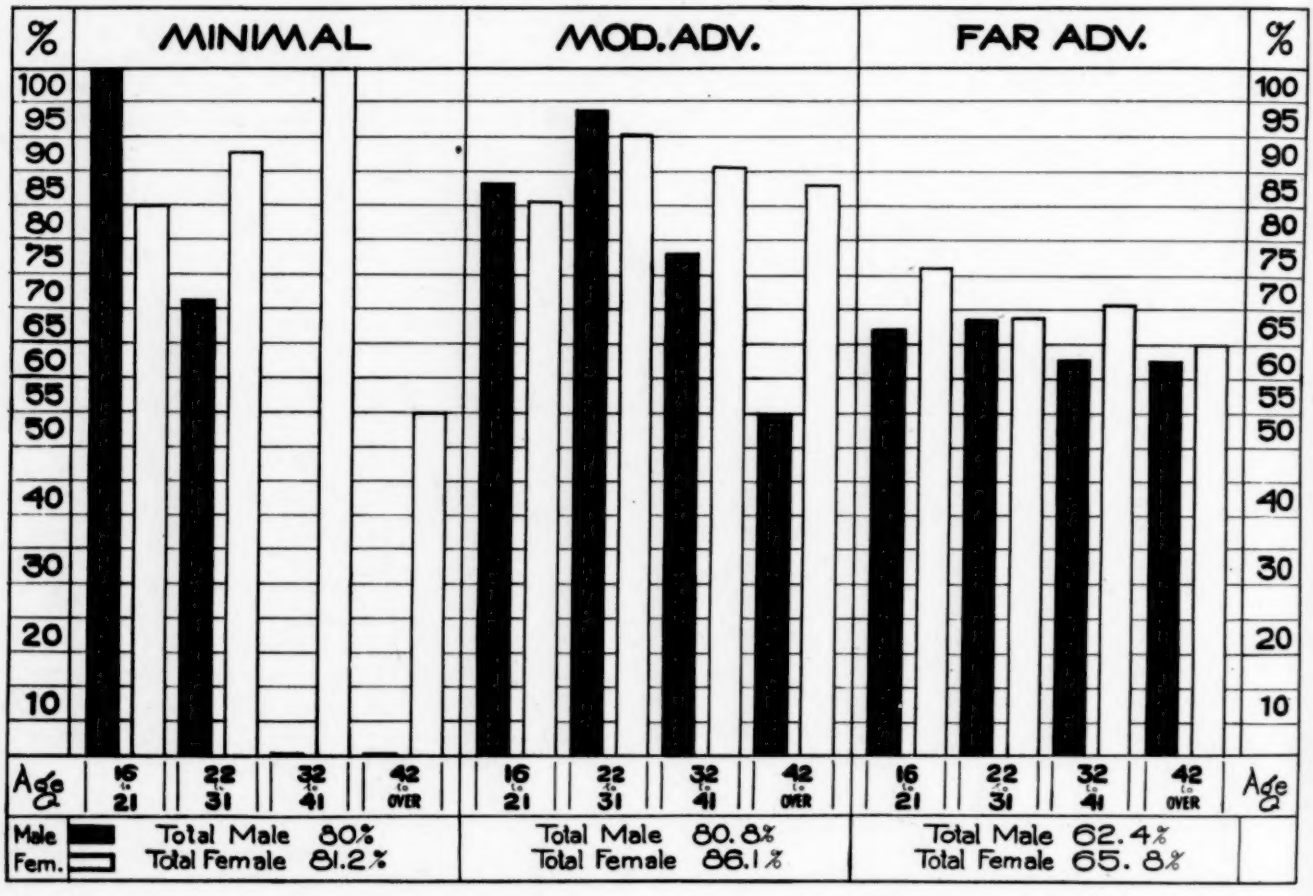
Regarding sputum conversions, of the 40 minimal cases studied, 21 were positive and of these, 17, or 80.9%, became sputum negative. Of the 256 moderately advanced cases, 186 were positive and of these, 156, or 83.9%, were converted. Of the 974 far advanced cases, 896 were positive and of these, 577, or 64.4%, showed conversion. In all, grouping the classifications, of the 1,103 cases, 750, or 68%, were changed from positive to negative. to collapse, and 645 converted from positive to negative. These figures represent a ratio of 36% conversions. In addition, there are at the present time 354 patients being carried as positive sputum cases, many of whom doubtlessly will be cleared. That this is no mere guess, is indicated by the fact that 20% of them already have one or more negative sputa, but lack the three successive negatives which we demand before we class a case as converted.

Now, as to the combined figures! Adding the 750 cases converted from positive to negative in the Sanitarium to the 645 conversions in the field unit, we have a total of 1,395 conversions in the six-year period. In other words, 1,395 open cases have been neutralized by the joint efforts of the dispensary and Sanitarium units. To put it still another way, 1,395 contagious cases, a townful of carriers, have been made safe for the community.

What influence, if any, this large scale conver-

sion has had on the mortality rate, it is difficult to say. In 1931, when the campaign started, 2,290 people died in Chicago of tuberculosis; representing a death rate of 66.2; in 1936, the number of deaths was 1,967, and the death rate 56.3. In more graphic illustration, there were 323 less deaths, or, approximately, one less funeral a day, and a drop in the rate of 15%. The greatest gain, however, is for the future. The hundreds of cases collapsed today must, of necessity, react favorably in the incidence. The fountains of infection we shut off must, inevitably, have repercussion in better figures. Control of the open case controls tuberculosis, and every positive case neutralized represents a positive health gain and lessened infection. lapse program gains momentum, its public health significance will lay hold of the imagination, and lead automatically to betterment.

In conclusion, so much for the present, but what does the future hold? First, and above all, we think the future will gradually dissolve the phantasy of expectant treatment for the working man. There is no expectant treatment for the laborer who subsists on wages, and has no financial reserve of the calibre needed for tuberculosis. He can not pay his way in the sanatorium, and the accommodations of the public institutions are pitifully inadequate. In Chicago, there are 1,800 free beds and an estimated tuberculosis population of 20,000 in need of sanatorium care; in the United States



Sputum Conversions in 1,103 Positive Cases Tabulated According to Age, Sex, and Stage of Disease

At present the main discouraging feature has reference to the type of case seen in dispensary practice. Ninety-seven per cent advanced tuberculosis can hardly be said to constitute a favorable working medium. The campaign of tomorrow must take this factor into consideration, and attempt to improve it. More early cases must be found. The failure to find the minimal case is to be construed as a serious handicap, and a weakness, which we must make every effort to remedy. It is the failure of many-sided causation, due, in part, to an imperfect mechanism of discovery, in part to the ignorance of the laity, and in part to the laxity of the private physician in reporting cases. It is not too much to hope that as the col- an estimated tuberculosis population of 200,000 is dependent on 80,000 beds. In the United States, too, a negro tuberculosis population of over 200,000 has at its call a bed capacity ratio of less than 3%. In the sanatoria the limits are drawn close by fixed accommodation; in the field there is no such limitation. The economic consideration expands the possibilities enormously! As against the $15 to $20 a week for a sanatorium patient, place the $40 a year, the actual cost for a field collapse patient in Chicago, and we have the answer.

Pneumothorax is not only a cheap weapon; it is also a mechanically specific weapon, a weapon already widely effective. When the phthisiotherapists and public health men get a real hold on it,

they will have a means of reducing what Dr. Tice calls, "that fictitious picture, 'the irreducible minimum'."

Discussion:

DR. FREDERICK TICE, Chicago: This gives me an opportunity to express publicly the appreciation of Dr. Hruby and myself for the support and cooperation which we have received from the entire medical staff of the Sanitarium and the Dispensary. Without their support and cooperation we could have accomplished nothing.

Dr. Hruby has called attention to the excellent results in the minimal cases, and also has directed attention to the deplorably small number of early cases. Most of the cases come to us far advanced. At the present time it is necessary to emphasize the necessity, particularly on the part of the examining physician or surgeon, of making a complete and careful examination because the results are in direct proportion to the extent of the disease. It is necessary to emphasize the continuation of our campaign instituted 30 years ago to detect the early cases. Along this line at the present time the Board of Directors has instituted tuberculin testing of all school children in the City of Chicago. All positives are then x-rayed. At this time we have a mobile x-ray outfit to take to the school. All the positives are then kept under observation, but where there is tuberculosis there must be some source of infection which leads to careful examination of every member in that family. By so doing we are detecting the early cases.

Along this same line the campaign to provide pure milk has practically eliminated, as you all know, bovine tuberculosis. With the elimination of bovine tuberculosis there has also been eliminated the unintentional vaccination in children, uncontrollable it is true.

With our present campaign and with the decrease in tuberculosis mortality, it is conceivable that within a very few generations we will have a race devoid of immunity to tuberculosis. Anticipating such a possibility, we have now instituted a laboratory of experimental research, modeled after, and conducted identically analogous to, the Pasteur Institute in Paris, in which the B. C. G. is manufactured and is being applied to infants throughout the city, for the purpose of producing immunity in the unprotected child.

The Abdominal Cavity

—Some of the Most Common Dangerous Operations Therein—

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I WISH to speak briefly and to the point on abdominal operations.* The most common things which bring the surgeon to a dangerous operation are:

1. Rupture of the appendix.
2. A perforated gastric ulcer.
3. Intestinal obstruction from any cause.

The mortality of appendicitis and perforated ulcers has decreased to a small fraction of what it was 30 years ago. It is still larger than it should be, by 20% or more. The question arises, is this due to late diagnosis? If we grant that this is true then why do we not operate earlier? Is it not due to the fact that we wait for symptoms of obstruction and by so doing permit the pathology to be so far advanced (gangrene and absorption) that the patient's condition is much worse, and therefore the risk is much greater, and the death rate higher. In other words we should operate these patients before we do, and therefore prevent the danger that comes later.

The safest way to handle the case is to write an ordinary history stressing the points in the case that in particular apply to the diagnosis. Write the history yourself if you do not have the regular person who writes your histories to do it. Follow this by a careful physical examination, paying particular attention to what the history points to as being the most probable diagnosis. The next thing is the laboratory work. Examination of the urine with reference to sugar should be made. If the patient has a rise of temperature have a white and differential blood count made to determine something about the patient's ability to withstand an operation. In cases of appendicitis a patient's power of resistance is very low—if there are 90% or over of polymorphonuclear cells. When a pain is severe enough that the patient can fix the exact time when it started, or if the pain awakens the patient from his sleep, it is liable to be a perforated gastric ulcer or very acute appendicitis.

Appendicitis seldom occurs in infants, but most often in young adults.

The thing which causes the greatest number of dangerous operations in the abdominal cavity is the ruptured appendix. Gangrene is the cause of this condition. It may be feces or obstruction from any cause. Following this the intestinal contents get in the abdominal cavity, which sooner or later causes a peritonitis. This, if not checked, spreads over the entire abdominal cavity and a fatal termination may be the result.

Everyone knows that to remove the appendix before the gangrene takes place is the most sensible thing to do. This requires an early diagnosis and stresses the point that the earlier the diagnosis is made and the sooner the appendix is removed the more liable the patient is to recover.

HOW is the infected area around the gangrenous appendix to be handled? The opening in the abdominal wall must be large enough to pack drains enough in it and have them all packed close together so the pus will come out by capillary attraction and physical drainage and adhesions of the uninvolved intestines. These drains should be all placed against each other and close enough to encourage drainage by capillary attraction and by the position the patient lies in. The patient's body should be placed with head in an upright position at an angle of about 45° with two pillows under the knees of his flexed legs. He should be given glucose intravenously—1,000 or 2,000 cc. glucose per day. It is also proper for him to have 1,000 to 3,000 cc. of normal salt solution subcutaneously per day.

If it is a chronic case, and the temperature is 102 or more for some hours, the resistance is not good and a drainage operation is necessary. In this case make the incision three or more inches

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* Read at the Annual Meeting of the Surgical Association of the Rock Island Lines, Ft. Worth, Texas, November 15, 1938.

long and drain it wide open. Use gauze—wet with normal salt solution or saturated solution of boric acid. These drains should be packed to the bottom of the abdominal cavity, and they should not be removed for three or four days. When the time comes, replace all of those removed by others which have been saturated also with boric acid or normal salt solution. This form of treatment should be continued until the wound is seen to be healing and the drainage is much less. Do not quit the packing-in of these drains until the wound is much smaller and most all of the pus has disappeared. Again pack the drainage opening until enough healing has taken place that if the patient coughs he will not cause any intestines to be forced out of the abdominal cavity.

If it should happen that your next case would give a history wherein for several months the patient has had a definite pain in the location of his stomach, which came on a short time after he ate and stopped when he was again placed on complete rest in bed and a starvation Sippy diet, and if this history has repeated itself several times, you are justified in diagnosing a perforated gastric ulcer. In a case of perforated ulcer of the stomach the first hypodermic of morphine, ¼ gr., does not relieve the pain. The second dose has some appreciable influence in relieving the pain.

Some writers claim that no one develops a chronic ulcer unless he is born with a certain type of stomach which is part of his physical make-up and remains unaltered as long as he lives.

Ask a patient whom you suspect has a perforated gastric ulcer to turn on his side and notice the severe pain which accompanies the movement. The location of the pain will very likely be the location of the ulcer.

The intense shock and pain of a perforated gastric ulcer, acute pancreatitis, with a strangulated gut, shows that the patient's condition is serious and immediate operation is indicated.

If the taking of food stops or starts pain in the region of the stomach it points to ulcer of the stomach or ulcer in the region of the stomach. If a test meal shows excess of HCl it points also to ulcer of the stomach. If no HCl is found it speaks against ulcer of the stomach.

If you have diagnosed a perforated gastric ulcer, an immediate operation is necessary and the quicker it is done the better. Make an abdominal incision large enough to have plenty of room to feel the stomach and close the opening by through-and-through sutures and tucking in so the bleeding and leaking will stop. Follow this by another row of sutures that do not go all the way through the intestinal wall. From this time on finish the operation any way you desire.

The smallest ulcer seldom heals in less than a month. What is suitable for the first week's diet is always suitable thereafter.

When the ulcer has healed soundly the patient can pass at once to an intermediate diet. This should be followed by a diet with milk as the main article. There is always a presence of hydrochloric acid in the stomach.

The position of an ulcer in the stomach is of greatest significance as regards possible malignancy. A chronic ulcer situated on or within one-half inch of the greater curvature should be regarded as malignant. Ulcers at an inlet or outlet of the stomach are often malignant. All benign growths of the stomach are liable to undergo malignancy.

Perforation of a gastric ulcer or duodenal ulcer, and acute pancreatitis, are about the only conditions which will cause a man to faint.

Acute intussusception occurs generally in infants under two years of age. In intussusception be careful to get all of the gut involved and remove all of the gangrenous part and the part near the gangrene. Intussusception often begins with the appendix.

Cancerous growths of the large intestine most often occur in persons over 40 years of age.

The treatment of acute obstruction is one of the well known failures in present-day surgery.

Injuries of or in the abdomen where there is no open wound may be very hard to diagnose.

In traumatic injuries of the abdomen it is often necessary to wait two or three hours to determine the proportion which shock, hemorrhage, and pertitonitis take in producing the symptoms. If shock is present after three hours there is most always some serious lesion of the viscera. If a rupture of the bladder is suspected, use a catheter and attempt to drain the bladder. If you cannot free the bladder and pain begins in the bladder region shortly, you are justified in proceeding to operate to close the bladder.

I wish to say that 35 years of experience after graduation, which includes internship in general, surgical, and maternity hospitals, assistantship in surgery, and private practice in surgery, have caused me to believe all that I have told you, and from my experience I have considered these things important enough to pass on to you.

In closing, I wish to say that it takes a great deal of time to take a general history and make a complete physical examination and a full laboratory examination. But in the end it pays, and it is for yours and the patient's benefit.

Case Reports:

PATIENT L.K.: RUPTURED APPENDIX: Entered hospital September 9, 1936. She was carried in. The illness began by pains in the abdomen. She was taken suddenly ill with severe pain in the abdomen which lasted about two hours. The pain ceased after vomiting, and pain was spasmodic since then, and she complained of her abdomen being sore continuously. Had had chicken pox, measles, and whooping cough. Had pneumonia, January, 1935. Had tonsilitis several times. Appetite good. Bowels, regular. Kidneys O.K. Eyes react to light and accommodation. No redness on lower lids. Ears, no tenderness over mastoid. Hearing seems normal. Nose, no obstruction Mouth, hygiene good, tongue coated. Tonsils enlarged. Throat not acute. Neck, no enlarged glands. Heart had a rapid beat, no murmur, no enlargement. Lungs, no dullness, no cough.

Abdomen, slightly distended. Definite firmness and tenderness in right lower part. Inguinal glands slightly enlarged. No history of fracture, and knee jerk present. Working diagnosis acute appendicitis. Opened, incision McBurney. Appendix removed by ligation and linen purse-string suture. Abdominal cavity packed with gauze and all of the intestines packed away from lower wall in lower part of abdomen. Six rubber drains and one one-yard roll as a drain inserted. Fifteen one-yard rolls were used. The count was O.K. Dressed. Medium amount of purulent drainage and work continued until September 28. Temperature at dismissal 99°. Left hospital much improved and returned for dressings at times. The patient was able to go home in a car.

PATIENT J.C.: PERFORATED GASTRIC ULCER: Entered the hospital October 14, 1934. He was referred by Dr. Gross, of Lindsay. The illness began about one week before the patient entered the hospital, with slight pains in epigastric region. Patient was not bedfast until about noon of the day he entered the hospital, when the pain became more severe in the right hypochondriac region. Patient had not been nauseated or vomited. He had had similar attacks but none as severe as this one. Patient was drowsy from two hypos, given by doctor when he started from home. Examination was made and the Kline test was negative; hemoglobin 95%; leukocytes per cubic millimeter, 17,000; erythrocytes, good color; small lymphocytes 2; large lymphocytes 4; polynuclear neutrophiles 94. Bowels fair; kidneys O.K.; appetite liquid diet. Sleeps fair. Has never had so severe an illness. Had had the usual childhood diseases. No cough. Had a large amount of flatus. Pain relieved, by eating, only for a few minutes. Working diagnosis appendicitis, cholecysitis, and perforated ulcer of the stomach. Appendix enlarged, chronic. Incision was made in the right rectus muscles. Removed appendix by ligation and linen-string suture. Cholecystotomy. Drained gall-bladder by stitching to abdominal wall. Gall-bladder, thick black bile. Stomach perforated, ulcer lesser curvature lower quarter. Ulcer closed, one layer plain No. 2 and one chromic No. 2 catgut. Twenty one-yard and one five-yard rolls of gauze used. Count O. K. Two thousand cubic centimeters salt solution subcutaneously. Patient left hospital October 30. Condition very satisfactory. Temperature remained practically normal from beginning of the gall-bladder drainage.

PATIENT W.J.H.: RUPTURED APPENDIX WITH PERITONITIS: Aged 44, of Geary, Oklahoma, was entered in the hospital October 23, 1935. His working diagnosis was perforated peptic ulcer. The patient complained of pain in the right side and soreness over the entire abdomen. Patient states: "The first attack was yesterday afternoon." His wife gave him a large dose of $MgSO_4$ after which he began to have severe cramps over the entire abdomen. Hot water bottles and hot clothes were applied to the abdomen. He was in continuous pain and called a doctor at 3:00 o'clock the next morning. The pain was more severe in the right side. Kidneys O. K. Did not urinate that day. Bowels O. K. Appetite good. Patient had the usual diseases of childhood. Habits, smokes. Large amount of thin fluid filling peritoneal cavity. All viscera brilliant red. Extremely large appendix, gangrenous, and ruptured with fecal material in peritoneal cavity. Gall-bladder adherent to liver. Small nodule in pylorus of stomach. Right upper rectus incision. Stomach explored. Appendix removed. Two drains in pelvic cavity, one to liver and one to stump, one drain in abdominal wall. Routine layer clearance. Demal in skin. Two thousand cc. saline suf "Q"; 1,000 10% glucose intravenously. Death due to generalized peritonitis following rupture of appendix.

Horseshoe Fistula in Ano

—Pathogenesis, Diagnosis and Treatment—

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SELDOM does one advise surgery upon a fistula in ano without having to defend the end results of the procedure.* Most patients possessed of fistula sooner or later come in contact with or hear of some fellow sufferer who is incontinent or whom surgery has failed to cure. Unfortunately, this fear causes the patient to harbor his disease until what was originally a simple process has become a complicated one and one which will tax the skill of the surgeon to effect a cure, at the same time preserving the normal function of anorectal mechanism. Such a complicated fistula is the "horseshoe", so designated because of the configuration of the tract. This term refers to that form of fistula which partially surrounds the rectum, crossing from one side to the other. It may be anterior, traversing the perineum, or posterior in front of the coccyx. (Fig. 1).

Anterior horseshoe fistulae are usually quite superficial and operation by incision is relatively simple and effective.

The posterior variety is the most usual form. It is deeper, having its internal opening in the posterior commissure between the sphincters and one or more external openings on one or both sides. Occasionally a secondary internal opening above the sphincter is present. Occasionally there may be no external opening and then a blind internal sinus is present.

One of the chief reasons for the failure to cure anal fistulae is misconception as to the point of origin and progress of the pathological process. Many surgeons believe the cause to be an abscess about the anorectal area. Abscess, perianal or ischiorectal, is very much a part of the process but certainly secondary and by no means the primary cause. The anus is always the primary seat of a horseshoe fistula.

Ulceration and infection of the anal canal are

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* Read before the Congress of Railway Surgeons, Chicago, September 22, 1937.

always forerunners of horseshoe fistulae. Whether due to a cryptitis or a traumatic rupture of otherwise normal anal canal is for practical purposes beside the point.

The life history of horseshoe fistulae is in the following sequence: Upon the passage of a hard or constipated stool there occurs pain and an abrasion in the posterior commissure. Infection enters beneath the lining membrane, burrowing with subsequent abscess development in the post-triangular space. It may rupture through the skin at this point; thus a simple fistula is the result. More frequently it ruptures laterally into

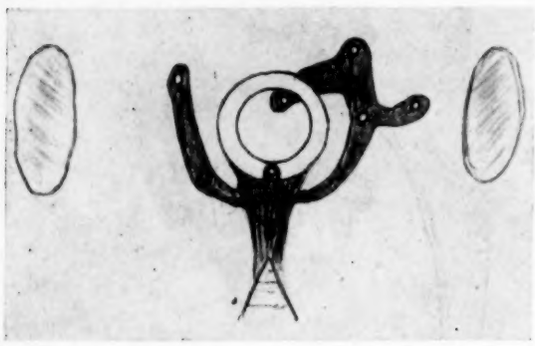

Fig. 1

one or both ischiorectal fossae. When this occurs the patient usually has a sense of partial relief due to the looseness of the fat in this fossa. After gaining entrance into these fossae, it is limited only by the anal fascia above and the obturator laterally; therefore, an extensive infection and abscess may here occur without great discomfort. Eventually it approaches the skin and ruptures externally in one or more places, or it may invade the anal fascia and levators, finding its way back to the bowel wall which it may perforate, thus forming a secondary internal opening which will always be above the sphincter. It may fail to perforate the bowel wall and thus an abscess remains between the levator and rectum. (Fig. 2). After rupturing of the abscess and partial collapse of the cavity, the epithelium of the skin may close and then, due to a lack of exit and the constant milking of gas and feces through the internal openings upon muscular contraction in the process of defecation, the abscess cavity in due time is again distended; it may rupture again at its former exit or a new opening may be created. This process, continuing over a period of months and often years, presents the case sometimes referred to as the "watering pot" or "prairie dog nest", involving the entire ischiorectal space. Very occasionally the ischiorectal abscess will rupture backwards through the tract of its inception. Then no external opening will be formed and a blind sinus is the result.

The diagnosis of a horseshoe fistula is not difficult, if one keeps the picture of its origin in mind. The history can usually be brought out by intelligent questioning. The onset of pain and spasm of fissure followed by abscess with perforation or necrosis of one and then the other ischiorectal fossa with subsequent chronic drainage and recurrent abscess immediately puts one on guard. Proctoscopic examination and the establishment of a posterior internal opening makes one feel reasonably certain of the diagnosis. The establishment of the many possible tracts and their course is, however, not such a simple matter and failure to do so is one of the pitfalls of fistula surgeons, often necessitating another operation or resulting in recurrence. The use of the opaque oils and stereoscopic x-ray examination is of great help. In spite of this precaution, one so frequently begins operation upon what appears to be a rather superficial fistula only to find one or more tracts coursing deeply into the ischiorectal space or upward along the bowel that it seems best to be guarded in outlining the period of hospitalization and postoperative convalescence to the patient in order to avoid subsequent embarrassment on the part of the surgeon and dissatisfaction of the patient. It is also for this reason that, unless one is absolutely certain a simple superficial fistula is being dealt with, infiltration anesthesia will be unsatisfactory and either general, spinal or sacral anesthesia should be instituted in the beginning.

The treatment of horseshoe fistula in any phase of its development is surgical with the exception of the acute ulceration before sloughing has begun. Here careful attention to bowel lubrication, promotion of rest to the parts together with cleansing and soothing applications may secure healing of an acute fissure or crypt. If these measures fail, it will usually be due to improper drainage, and then it should be attacked surgically by either excision of the lesion, or incision of the external sphincter in the posterior commissure with trimming of the edges. Both operations have as their principle the eradication of the inflamed tissue and the promotion of drainage.

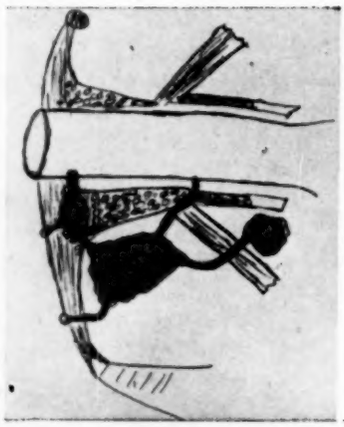

Fig. 2

Older texts refer to vigorous and complete sphincter dilation, depending upon the pathological process healing before the sphincter is able to regain its composure and function. I mention this only to condemn it as unsound and not dependable. After abscess formation has occurred, the problem becomes one of immediate incision. This attitude may be questioned by some who claim it is better to wait until function can be demonstrated and the process has approached near enough to the surface as to make incision easy to do. This seems like letting the fire in the house rage until it has burned a hole in the roof so that water may be poured in, thus avoiding chopping a hole in the roof in the beginning. Certainly there can only be greater damage to tissues by such a waiting program and in the deeper abscess the danger of a secondary internal opening is constant. It is our practice to incise the moment abscess formation can reasonably be diagnosed. It has been my ob-

servation that, if an abscess is opened early before great destruction has occurred and the internal opening is given drainage by excising the external anal margin, the connecting tract will sometimes heal primarily, although it should not be expected to do so. All abscesses should be widely incised and the skin edges and fat trimmed in order to prevent subsequent sealing and blockage. Unless deep and of a chronic nature with fibrous granulomatous walls, no packing is inserted and then loosely only for from 24 to 48 hours.

Except for abscess in the posterior triangle or those near the origin in the posterior commissure, the connecting tract is never laid open at the time of treating the abscess. The patient should be informed of the probability of a resulting fistula and advised of the subsequent plan of treatment.

When considering a plan of treatment for a fistula with extensive involvement of one or more ischiorectal fossae and possessed of multiple external openings, it is my opinion that considerable postoperative granulating time and discomfort can be saved, as well as making the operation easier, by taking a little time to promote better drainage and thus permit the infection to partially subside and the tracts and cavities to collapse. This is best accomplished by incision where necessary, or perhaps dilating the already present external opening, rest and hot Sitz baths. Irrigations are of little help, are hard to do and may be a means of spreading infection.

In preparing the patient for operation, in addition to routine measures for surgery, special attention should be given the bowels. The patient should be brought to operation with the large bowel as empty as possible. This should be accomplished by enemata of non-irritating solutions, such as normal salt. It is futile to try to sterilize the rectum and bowel, but it is equally unfortunate to have fecal contamination of the operative area within two or three days after operation.

Fig. 3

Either the lithotomy or prone position with the hips elevated will be found a satisfactory position, and with good anesthesia determined, a systematic survey of the process present should be begun. This must be done in order to formulate a plan of attack suitable to the individual case. In my experience I have found it better to begin by a careful inspection of the anal canal. In order to do this it is necessary to dilate gently to 5 or 6 cm. In most cases the internal opening will be easily found in its usual location in the posterior midline. I stress the importance of gentle dilatation and inspection as the internal opening may be quite small, even in an extensive fistula, and vigorous dilatation and distention of the muscles may so distort the tissues as to make a systematic search difficult. It is also difficult to trace a small tract about the anal canal while the sphincter is being stretched taut by a speculum. When the internal opening is located with a small blunt hook, it is gently dilated and mental note of its direction made. A search is then made for secondary openings. This must be carried well up into the ampula. If a secondary opening is present, it will almost always be above the primary opening and thus surgery will involve most and more frequently all of the sphincter muscle. Since it is never advisable to section any part of the muscle in more than one place, it will necessitate multiple stage operations.

Fig. 4

A method sometimes recommended for locating the internal opening is that of injecting a dye, usually methylene blue in hydrogen peroxide into the external opening and observing it emerge through the internal opening. I wish to offer a warning about this procedure. On one occasion I caused an acute abscess to develop distant to the fistula. I was at a loss to explain this until operating another case following the use of this method, when I discovered blood vessels at a considerable distance from the tract containing the dye. Since then I have discontinued its use. I presume the gaseous distention of the tracts must open small vessels as well as the tracts.

Cure of fistulae is dependent upon opening of all tracts or the conversion of blind ditches into open ones. In case the internal opening is external to the sphincter and the external tracts do not too completely encircle the anus and are reasonably superficial, this may be done at one sitting. I think it matters very little whether one begins at the internal opening and dissects outward or vice versa so long as all tracts are opened and the overlying skin edges trimmed so as to prevent sealing and bridging. All bleeding is checked and the wounds lightly packed with vaseline gauze, if packed at all.

When dealing with a deep fistula and one whose internal opening lies between the sphincter, complete dredging will leave a widely gaping wound which is hard to heal, having considerable deformity and frequently permanent incontinence of gas and liquid feces due to the wide separation of the cut ends of the external muscle. In this case it is better to do a two-stage operation, the external tracts being laid open at the first setting. When these are nearly healed, the posterior tract connecting the internal opening is laid open. This

will then permit the ends of the sphincter to fall near together and if careful cleanliness is practiced in the aftercare, they will heal upon a good block of fibrous tissue and continuity be maintained.

When the secondary internal opening exists above the sphincter, the external tracts and posterior primary opening are treated in the usual manner and the secondary opening is not treated until healing of the previously operated tract is complete. I have found the passing of a seton a useful procedure to aid in drainage and thus prevent further burrowing. It also is of great assistance in locating the opening when ready to divide the muscle at a later date. A stout silk thread is passed from within the rectum out through the internal opening and the most direct tract to the external surface. The ends of the thread are then tied. If it does not constrict the tissues it will not be uncomfortable. (Fig. 3). After healing is complete the sphincter is then divided, taking care to cross the muscle fibers at right angles. It is most important always to divide the muscle at right angles to its fibers. (Fig. 4). When done so obliquely, a gaping scar will result, healing will be slow and the muscle weakened. Temporary incontinence will always ensue when the sphincters are completely divided and the patient must be warned of this. However, if the stools are kept well formed by proper diet, it is not the great inconvenience imagined.

In the after care of fistular wounds, cleanliness is of the utmost importance. Thorough cleansing after each evacuation with a mild antiseptic as boric acid solution should be practiced; in addition several times daily the discharges should be sponged away. A mild silver is useful to stimulate sluggish areas, as is balsam of Peru and mild ichthyol. The wounds should be daily inspected by the surgeon to avoid pocketing and bridging which will defeat a cure.

Healing in the average case should be complete in three to six weeks and a most grateful patient the result.

Discussion

DR. A. W. IDE, St. Paul, Minnesota: We are indebted to Dr. Pontius for his complete review of this subject.

There may be some argument as to just exactly the role played by fissures and abrasions in the etiology of fistulae. There is no doubt, however, but that fistulae are caused by infection that gains entrance to the submucous tissue in the region of the anus. It is important, therefore, that these minor ailments in the region of the anus be carefully looked after and treated in order to avoid this more serious condition.

It is our practice to use caudal anesthesia in operating on rectal fistulae. If necessary, this can be supplemented with infiltration. A good caudal anesthesia is ideal for this work. The surgeon must painstakingly remove all sinuses. If he fails, and he sometimes will, then a second operation will be necessary.

Our experience in operating on these cases has been very satisfactory as far as incontinence is concerned. I am inclined to think that the danger to the sphincter muscle is sometimes over-stressed. There is no doubt that it is necessary to cut the sphincter in some cases, if they are to be adequately treated. However, it would seem to me that many fistula can be radically removed without injury to the muscle. In this connection, I would like to quote from Lockhart-Mummery:

"There are some points in connection with the anatomical relationship of a fistula which are most important from the point of view of treatment. It is frequently taught that the commonest arrangement of a fistula is that in which the external and internal openings communicate by a tract which passes between the two sphincters and this is the arrangement usually shown in the illustrations in books on the subject. This is not, however, the commonest arrangement, and it is fortunate that it is not so. The internal opening is usually situated posteriorly at the mucocutaneous junction, but the tract as a rule does not pass deep to the external sphincter, but superficial to it.

"It is quite obvious that if the fistula passed deep to the external sphincter, the latter would be divided in laying open the fistula. If, when operating for fistula, one divides the tract to the internal opening by cutting down on to the director with an ordinary scalpel, it is quite easy to observe whether or not one cuts the fibers of the external sphincter. I have been surprised to find in how few cases the muscle has been cut.

"The appearances are often most deceptive, for when a probe is passed through the fistula there is a considerable thickness of tissue transfixed by the probe, and it seems as if the external sphincter must be included. There is a certain amount of inflammatory thickening at the anal margin, which causes the deceptive appearance and leads one to suppose that the external sphincter muscle is superficial to the fistulous tract."

Hernia

— *in Heavy Industry* —

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Minneapolis, Minnesota

INGUINAL hernia is a very pressing problem in heavy industry today and is costing large sums of money. The only effective measure which the employer can use to guard himself against this loss in money and disrupted operations is to resort to pre-employment examinations and subsequent rejection as unemployable of all those who have frank or potential hernias. This is particularly true in view of the fact that some courts have ruled that no employee can be bound by a waiver against making a compensation claim for a hernia either frank or potential.

This paper indicates how this problem can be handled from an economical and plant efficiency standpoint. It does, however, bring out another problem of a social nature for which the writer offers no solution, namely, what shall be done with the increasing percentage of men who are placed among the unemployables?

The following is an analysis of inguinal hernia in pre-employment examinations for heavy industry, during the last six years:

Eight hundred and thirty-three patients have been examined for employment in one manufacturing plant which is engaged in heavy industry.

Of these, 81 were rejected as unemployable.

There were 49 rejections for hernia, which is a rather startling figure, and of this number 23 were frank hernias, and 26 were potential hernias.

In classifying these hernias the following method was used: After inverting the scrotum, and with the finger well up in the external ring, and the palmar surface of the examining finger toward

the examiner, the patient was instructed to cough hard:

1. If no impulse was found a record of 0 was made.
2. One-plus indicated that a minimal impulse was felt which did not extend down to the external ring.
3. If an impulse was felt down to the external ring this was considered two-plus, and all such cases were considered potential hernias and rejected.
4. Any impulse which came through the external ring was considered a three-plus, or a frank hernia.
5. Any impulse that apparently continued on down to the testes was considered a four-plus, or a complete hernia.
6. A broad-necked bulge occurring near the pubis and above and medial to the external ring was not considered pathological. Andrews has pointed out that this is due to a congenital weakness resulting from the high insertion of the conjoined tendon on the rectus sheath.
7. In the cases of frank hernia no attempt to classify them direct or indirect was made.

Of the 26 patients who were rejected as potential hernias seven were bilateral and 14 were on the right side only, and five on the left side only. Of the 23 frank hernias, only four admitted knowledge of the presence of these hernias.

In 622 patients (75%) there was no impulse on either side. There were 151 cases in which a one-plus impulse was found. All of these cases were considered employable (18%). Of these the one-plus impulse was found in 83 cases to be bilateral; and on the right, 55 cases; and on the left, 16 cases. It is to be noted that the impulse when found on only one side was found to be about four times more frequent on the right side than on the left side. It is worthy of note that the men rejected for potential hernia also showed this fault, three times more frequently on the right side than on the left side. In the frank hernias 12 were on the right and 11 were on the left, the others being bilateral. I do not know the reason for this disparity between right and left impulses, although several causes can be considered, including the examiner himself.

The average age of all men examined was 27; those who have a one-plus impulse, 30; those with a two-plus, 31; and those with frank hernias, 40. Only four men of the 23 who had a definite hernia admitted knowledge of the existence of the hernia at the time the history was taken. This would indicate that history alone, so far as hernias are concerned, is of little value in this type of examination. There were 17 patients who had previously been operated upon. Of this number 13 of the operations were holding up satisfactorily, three had frank recurrences, and one had a potential recurrence. Therefore 25% of the operated cases were rejected as unsatisfactory from a hernia standpoint.

So far as injection is concerned only three patients presented themselves: One was still under treatment; another had a one-plus impulse two years after injection; and the third had a frank hernia two years after injection. From this very limited amount of material it would seem apparent that both surgery and injection were not yielding the hoped for results in a very considerable proportion of the treated cases.

IN THIS particular plant there have been three claims for hernia since this examination has been instituted, but in no case has a claim been made for hernia which occurred after the examination. The following explains what I mean by this statement. One of the claims for hernia was in a foreman who had avoided being examined himself, and the other two both denied knowledge of the fact that they had a hernia at the time they were examined and gave no history of an injury at the time of that examination. However, when a hernia was discovered these men later put in claims stating that they then recalled accidents which had caused them to have pain in the groin at some time previous to the examination. Both of these cases were denied compensation by the Industrial Commission. This makes it very plain that the examination should be made before the patient is permitted to go to work, since there is a notorious amount of malingering and "skullduggery" in the claims made regarding the presence of hernia.

Of the 752 men who passed this examination, 67 were found to have visual defects of such a nature as could be corrected by glasses. The correction was made within 30 days after employment. Sixty-five cases of oral infection, associated with bad roots, were forced to have their mouths cleaned of infectious foci within 30 days. One hundred and twenty-three patients were found to have blood pressures ranging between 140 and 160, and in view of the recent work regarding labile blood pressure this result was considered to be of some significance, at least from the standpoint of future reference in regard to gradual development of malignant hypertension.

The conclusions, therefore, are:

1. Examination for hernia in heavy industry is an economy.
2. The examination must be made before employment.
3. History is of little value in determining the presence of hernia.
4. The incidence of recurrence after surgery or injection is apparently very high.
5. Most common cause for rejection is inguinal hernia.
6. Potential hernia should be rejected for heavy industry.
7. Only 75% of the men presenting themselves for examination were free from hernial stigma; 16% showed minimal hernial stigma, and after six years of observation none have developed hernia; 2½% were rejected for frank hernia, and 3% for potential hernia.

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2. ANDREWS: Direct hernia, *Surg. Gynec. & Obst.*, April, 1934, page 753.

Autologous Fascia Suture Technique

—*in the Surgical Treatment of Inguinal and Femoral Hernia*—

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IN SURVEYING the voluminous literature describing the many techniques in the surgical treatment of hernia, one meets the inescapable fact that the percentage of recurrences is high, particularly in the direct type.* Various writers have submitted statistics varying from 10 to 30% of recurrences in the latter group.

Inguinal Hernia

IN appraising the cause for the high rate of failures, which implies the analysis of the various techniques that are popularly employed today, one is impressed with the apparent defects in the technique as applied to the problem of cure of direct hernia.

The major problem in direct hernia, is the establishment of an unyielding wall from the point of high transplantation of the cord to the pubis. That is axiomatic. The Bassini, the Ferguson and the Halsted techniques do not permit of such a result, as the emergence of the cord at the lower angle makes the repair vulnerable. The Andrews imbrication, modification of the Bassini, is objectionable because of the tension resulting therefrom.

In 1902, J. L. McArthur first advocated the use of a fascia suture taken from the aponeurosis of the external oblique. Gallie, in 1921, advanced the idea of fascia lata sutures, the employment of which has met with splendid results, particularly in the treatment of recurring inguinal and ventral hernia. Numerous writers have advocated the use of the Gallie suture in the treatment of direct hernia on the premise that an autogenous suture is best adapted to establish an unyielding aponeurotic wall.

The criticism of the Gallie technique in the treatment of a primary hernia is in the necessity of employing another operative procedure, though minor, on the leg to remove the fascia lata. Again, criticism may be voiced against the use of the large fascia needle which is usually employed in such technique, because of the large openings made in the aponeurosis and Poupart's ligament.

The technique which I am submitting for inguinal and femoral hernia is an evolution of the McArthur idea. While the percentage of recurrences in indirect hernia is relatively small, yet the figures of 3 to 7% permit of a striving for better results.

On the premise that autologous fascia sutures are available from the mesial and lateral borders of the aponeurosis, and that the conjoined tendon is frequently congenitally defective, I have utilized the principle of using fascia sutures removed from the borders of the aponeurosis, to reinforce the aponeurotic suture line. The suture is approximately three or four millimeters in width and permits being threaded into a Mayo needle. A strip of fascia left attached above, reinforces the aponeurosis above the cord where it is locked and fixed with silk, and the strip of fascia left attached below, reinforces the aponeurosis below the cord.

In the direct hernia, I employ the plan of utilizing two strips of fascia, leaving each attached below, one to reinforce the suture of conjoined tendon to Poupart's ligament, according to the McArthur idea, and the other to reinforce the aponeurotic suture line. The high transplantation of the cord and pathological factors involved in direct hernia, make it only necessary to establish a firm aponeurotic wall in the lower angle.

We have employed these techniques in indirect and direct herniae for a period of four years, and they have been highly satisfactory. We have not seen a recurrence in a direct hernia.

Criticism of the imbrication methods in a bilateral herniotomy is met in this technique by the avoidance of tension. While we were ready a few years ago to give up bilateral herniotomies because of the high percentage of recurrences, we feel secure in employing the above technique in doing a bilateral repair.

I might say that the employment of this technique does not obviate the necessity of utilizing the other well established principles in the treatment of hernia, i.e., high amputation of the sac, high transplantation of the cord, and careful repair of the muscular defect.

Femoral Hernia

THE surgical treatment of femoral hernia permits with facility the use of the "autologous fascia suture technique."

Watson states the percentage of recurrences compiled from a number of surgeons, is about 5%. While this percentage of recurrences is relatively small, it is this reducible percentage of recurrences, and the economic factor, that has prompted me to develop this procedure.

The location of the femoral canal and the access to strips of fascia above Poupart's ligament, permits of the utilization of the "autologous fascia sutures".

A combined femoral and inguinal incision is made. The hernial sac is treated in the usual manner. Two strips of fascia three to five millimeters wide are dissected from the aponeurosis above Poupart's ligament, each strip being left attached below. After the closure of the aponeurotic defect is made with chromic catgut, one strip of fascia suture in a Mayo needle is employed to reinforce this aponeurotic suture line. The remaining suture is threaded into a Mayo or fascia needle, and the femoral canal is obliterated by suturing the inguinal ligament to the pectinate ligament, and locking the fascia suture securely. Additional interrupted chromic catgut or silk sutures may be employed, but these are rarely necessary.

Because of the simplicity of the technique, and

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* Read at the Annual Meeting of the Association of Surgeons of the New York Central System, Cleveland, Ohio, September 15, 1937.

the secure obliteration of the femoral canal, we have found this technique highly satisfactory. It has a justification on the economic basis. We have routinely permitted these patients to get out of bed on the third day, and leave the hospital on the fourth and fifth day, returning to work at an early date.

Summary

AUTOGENOUS fascia sutures, I believe, are superior to any foreign material suture that may be employed.

"Autologous fascia sutures" may be secured easily, are adequate, and obviate the necessity of an added operative procedure in securing fascia lata sutures.

The high percentage of recurrences in direct and indirect hernia, justifies a perseverance in improving previous established techniques.

The establishment of an unyielding lower segment wall is the important factor in the prevention of recurrence of direct hernia.

The facility and security with which the femoral canal may be closed by the use of "autologous fascia sutures," highly commend its use.

Occupational Hernia

—Prevention by the Injection Method—

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PREVENTIVE medicine has in many ways proved its value. The importance of preventive measures in social hygiene and sanitation and of safety devices for the reduction of industrial hazards cannot be too strongly emphasized. With occupational hernias excellent opportunities are presented in this direction—the first, so far, has already been seized by Rice and Larson in their paper entitled "The Injection Treatment of Large Inguinal Rings Without Hernia."[1]

Because potential occupational hernia can be detected very early it can be eliminated entirely as an industrial hazard. Could such prevention be generally adopted by those agencies affected there would be greater saving from loss of man-power and from expenditure of large sums of money for compensation, and even a saving of life itself.

Up to the time Rice and Larson began their work on the closure of large inguinal rings without hernias, very little had been done in prevention in these cases, and that little by surgical section where the question of obtaining or retaining employment was at stake. In these cases, however, surgery although effective has not been looked upon with any too great favor by the herniated. As a counter measure in place of surgery the wearing of a truss has been recommended. This is not a solution, since it is not a corrective of the condition. As a matter of fact in many of these cases the truss is worn at times with a great deal of indifference, sometimes irregularly, and often only when pain after exertion results. This is a common experience with those treating or advising treatment in such cases. Most often the truss had been poorly fitted. Truss wearing at best is an annoyance, and there is no indication for it since the advent of the acceptance of the injection method.

The expression "traumatic hernia" has given way to the more rational one, occupational hernia. Davis,[2] in an article analyzing 100 cases seen in the legal department of the compensation division of the City of New York, offers a definition of traumatic hernia. He defines it as "a hernia that has developed with an actual tearing of the peritoneum as a result of increased intra-abdominal pressure, or as a result of tearing or stretching of the inguinal ring or other hernial exit following injury." To one who has examined hundreds of hernias, a hernia fitting Davis' description is a rarity. The hernias which are brought before the compensation boards for interpretation as to their legal status are more aptly referred to as occupational hernias.

To understand the mechanism of the production of an occupational hernia it is necessary to mention the generally accepted theory of the etiology of hernia—that of Russell. Without going into a too-detailed explanation, Russell's saccular theory accounts in the best way for the various anatomical arrangements of inguinal hernia.[3] His explanation briefly stated is that in every case of inguinal hernia the processus vaginalis fails to become obliterated. In other words in every possible future hernia, some of the sac, no matter how little, must be present. It is this that produces the weakness at the internal ring predisposing to the development of hernia. Added to this factor, as demonstrated by Houghton in a series of cases,[4] every case found to have a small sac was associated with a large external inguinal ring.

Now, reversing Houghton's findings, it can be presumed that an enlarged external inguinal ring is an indication of the presence of a sac of some size either small or larger. These two factors, the presence of an enlarged external inguinal ring and a sac, define a potential hernia. The writer, including the examination of the hernial region as a part of the routine in the physical examination of over 8,000 male gastro-intestinal cases, found approximately 20% with enlarged inguinal rings. With all of these, on coughing, there could be felt an impulse high up in the canal, indicative of a sac. Not one of these was an outspoken clear cut case of complete hernia at the time of the examination. Many of these examined periodically for several years sooner or later developed definite complete hernias.

Russell's theory would, by its definition, classify all indirect inguinal hernias as congential. Hassett considers that 75% of all indirect inguinal hernias are congential. The question can be looked at from another angle, i.e., that the occurrence of hernia in more than one member of

a family is also an indication of its congential origin. It should be the practice of those engaged in hernia specialization to go thoroughly into the family history of all those with hernia. In this way it will be found that in a large number of cases more than one member of the family was or is herniated. The writer at present has two outstanding examples of this. In one, the patient is now being treated by the injection method after two postoperative recurrences. The father of this patient died of a strangulated hernia. The other case is a father 43 years of age referred for gastro-intestinal pains which were found to be due to an unrecognized (by him) bulging bubonocele. His son, 12 years of age, has a hernia which for the greater part of the time appears incomplete. During activity or strenuous exercising the sac with its contents is suddenly forced into the scrotum accompanied with considerable pain. The condition is readily relieved by pushing the sac and its contents back through the canal. This case is closely analogous to what happens in the production of an occupational hernia.

It is not unreasonable to assume that every occupational hernia may have been of congenital origin, beginning either as a potential hernia with a small sac and an enlarged external ring or as a bubonocele awaiting only an opportunity to extrude through the external ring. The hernia could result from a single act of violence, or several repeated acts, during which the canal enlarged and the sac with its contents pushed farther and farther down the canal. This is Morehead's belief,[5] and the writer from his own personal experiences in these cases agrees with him. A pertinent case just seen by the writer bears this out. Seventeen years ago the writer saw a patient, aged 23 years at that time, complaining of attacks of sharp pain in the lower right quadrant that came on immediately after the lifting of a heavy object. There was definite tenderness extending from the cecal region to the inguinal region. The external ring admitted the index finger freely up to an inch and a quarter, and on coughing a definite sac impulse could be felt. The left ring was somewhat smaller but yet slightly larger than normal. A diagnosis of chronic appendicitis had been made, which was not agreed to by the writer. Change of occupation was advised and there was no recurrence, the patient remaining in good health up to recently. Lately he has been having shifting abdominal pains associated with tenderness only in the lower right and left inguinal regions. The history revealed that since the present onset of symptoms he had been markedly constipated and strained considerably at stool. Examination showed the same tenderness as previously mentioned over both inguinal regions. The right external ring had enlarged slightly more than on the first examination. The left external ring had dilated to about 2 cm. and the sac with its contents could be palpated just inside the canal resting on the rim of the external ring which supported it. The recent constipation and the constant straining had forced the fecal-loaded descending colon and sigmoid behind the sac down the canal with sufficient force to stretch it with an accompanying dilatation of the external ring. In this case any one single act of marked violence would suffice to push the sac through the external ring, completing the hernia. There is another fact of importance in this case that should be emphasized and that is the effect of an excess amount of fat in the abdominal wall. This patient 17 years before had weighed 135 pounds. Now with a height of 67 inches his weight was 200 pounds. The abdominal wall showed a marked increase in the deposit of fat. The wall was so pendulous that when the patient was sitting down, the abdominal wall was literally resting in his lap. It is the increased weight of this heavy pendulous abdominal wall exerting a strong pull downwards that puts a continuous strain on the structures of the wall, the muscles, fasciae and aponeuroses. This produces a weakness of these parts, and ultimately with other factors tends to convert the potential hernia into a complete hernia. The writer has seen and treated many of these cases. Another case of potential hernia predisposing to a complete occupational hernia was also recently seen by the writer. This was a truck driver complaining of infrequent attacks of pains in the right inguinal region accompanied by almost constant gastro-intestinal distress. Examination revealed the presence of a large right external inguinal ring which readily admitted one finger a good distance up into the canal, and on coughing the typical sac impulse could be felt. This patient stated that he had a truss, but that he did not wear it constantly during the day, but only after the attacks of pain.

FROM the standpoint of occupational hernia the situation that presents itself is this: There may be present as discovered on a preliminary examination a potential hernia or bubonocele, the precursors of the occupational hernia. When such is found the person may be refused employment. In New York City, prospective applicants for the police force applying to schools of instruction preliminary to the regular examination are given a complete examination by a physician connected with the school. If a large external ring or a bubonocele is discovered, the applicant is notified that unless this is corrected he will be rejected when appearing for civil service examination. Many of these cases are now being treated by the injection method.

In some states occupational hernias resulting from known preceding incomplete hernias or other weaknesses of the abdominal walls are compensable. New York courts hold that any injury causing hernia or aggravating a pre-existing hernia is compensable. This is termed the liberal type of compensation. Utah has ruled that an incomplete hernia, subsequently completed through an independent injury, will ordinarily be com-

pensable. In South Dakota the Supreme Court favors compensation when a structural weakness of the wall has preceded the hernia. North Dakota approves compensation if the hernia is an aggravation of a pre-existing defect. Minnesota has ruled that under the Compensation Act an injury is compensable when it excites, stimulates, arouses or moves to action an existing latent condition so as to result in disability. Iowa and Michigan favor the herniated under similar circumstances. Even a complete hernia, already present, which as a result of injury becomes strangulated causing death, has been ruled as compensable in New Jersey by the court of Errors and Appeals, reversing a previous decision by the Supreme Court of that State.

The present trend is toward physical examination of all applicants for employment, and unless treated, rejection of those with hernia or hernia potentialities. The injection method of treatment offers an entirely satisfactory preventive measure in these cases. It is ambulatory and less costly than surgery. It is free from serious complications. While undergoing treatment the employee can continue employment. With actual hernias the percentage of cures has been as high as 97.5% in a controlled group treated at the surgical clinic at the University of Minnesota Medical School. Others using this method have had a similar experience. Rice and Larson, having treated 34 cases with enlarged external inguinal rings, report excellent results without complication. During the past year the writer has treated by the injection method 31 cases with large inguinal rings. In all of these on coughing there could be demonstrated by careful palpation sac impulse high up in the canal. Of this number 15 were referred because on physical examination a large external ring was detected. These workers had been advised to undergo treatment in order to obtain or retain employment. The other cases were discovered during the course of gastro-intestinal examination for the detection of the cause of gastro-intestinal symptoms. When to these latter patients it was explained that, aside from the fact that the closing of the canal and ring might be important for the relief of symptoms, the condition was also a forerunner of an actual hernia, they willingly consented to treatment. Some of them had already been informed by others of the presence of a potential hernia, and so were more readily agreeable to treatment by the injection method.

Inasmuch as these potential cases are virgin cases, and since the amount of stretching of the internal ring is not great nor the canal filled by a large hernial sac, treatment progresses nicely without difficulty or reactions. Even before the external ring is reached for injection it gradually becomes smaller as the result of the seepage down the canal from higher up of the sclerosing solution. After the canal has closed a definite ridge of fibrous tissue can be felt along its course. The final size of the external ring can be regulated by the number of injections placed around it. The writer always prefers a complete closure with only sufficient room for the egress of the cord. There is no danger of cord stricture, since the cord itself offers definite resistance to compression by fibrous tissue.

FOR the technique there is employed a 3-inch long, 20-gauge, short-bevelled needle. A needle of this length permits sufficient play for all degrees of abdominal thickness and also permits sufficient of the needle at all times to remain outside of the puncture point. This is important, since with the large gauge of the needle there is no danger of breakage at the hub. More than this, acute angle pointing of the needle can always be employed with a knowledge at all times of the location of the needle point. Entrance of the point into the canal can readily be felt by the sudden lack of resistance to it as it penetrates the tense fascia of the external oblique muscle. It is unnecessary to use the more irritant solutions in these cases since the tissues react very promptly to a less irritant injectant. Some cases require a smaller dose, as in these there is a very active response and a larger dosage causes pain. The writer guards against these reactions by starting with a dosage as small as 0.5 cc., increasing gradually if there is no pain or burning. The solution used is a 5% sodium salt solution of the fatty acids of psyllium seed. This is sterile and when properly injected painless. It builds firm fibrous tissue within three weeks following each injection. Histopathological studies have shown that there is no necrosis nor marked exudation. Twelve injections are given, three about the internal ring, four down the canal, and either four or five about the external ring depending on its size. It has been found in these cases that three injections about the internal ring are sufficient, since some of the solution injected just below this finds its way up to the internal ring. The amount injected varies from 0.5 cc. to 1 cc. about the internal ring the amount depending on sensation reactions; from 1.5 cc. to 2 cc. down the canal and at the external ring. No larger dosage than these should be given at the external ring, as otherwise there may result swelling of the cord, edema of the scrotum, or hydrocele.

Along with the injection a truss is worn during the treatment from one month to six weeks following the final injection. This period depends on the size of the external ring originally present. In cases where the ring is found to be smaller the truss is worn only during the day and while bathing. In other cases it can be removed at night after the sixth injection. Inasmuch as there is no danger, as in a complete hernia, of the breaking down of the adhesion by a large hernial sac, the type of truss used is somewhat different from those worn in complete hernia. The truss is of a spring type, but with a flatter soft rubber pad somewhat fuller at its upper end. The spring is covered with a latex or red rubber tubing and the connecting strip also of rubber. This permits bathing while wearing the truss. The pressure of the spring is firm but not as great as that with the complete hernia.

While wearing the truss before commencing injection the usual care of the skin must be exercised. Protection can be afforded by the use of a powder consisting of equal parts of cornstarch and boric acid.

IN SUMMARY: Enlarged external rings are indicators of future indirect inguinal hernias and as such in occupations become compensable potentialities. Because of this, employment at times is refused. All of these cases are factors of economic and social importance. All can be prevented by means of the hernia injection treatment. Because of the excellent results in the hands of those skilled in its use; because of its ambulatory and non-incapacitating features, it is recommended and its use advised as a preventive in all cases of potential hernia. It can also be used as a means of curing an already existing complete hernia which may become aggravated by trauma occasioned by employment.

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A.C.S. Minimum Standard

— *For Medical Services in Industry* —

IN ORDER that the Minimum Standard may be more readily understood, a brief explanation of its working principles is herewith presented according to its five clauses.*

"1. *The industrial establishment shall have an organized medical department or service with competent medical staff including consultants and also shall have adequate emergency, dispensary and hospital facilities and personnel to assure efficient care of the ill and injured.*"

Clause one refers to organization and facilities for the medical service. It has been repeatedly observed that there is not a lack of competent physicians, surgeons or medical facilities for industry but rather that there is inadequate organization on the part of employers for such service. The workmen's compensation laws generally require that the employer shall provide the necessary medical and hospital care for injured workers. Obviously the plan for providing this care should be so well organized as to prevent delay and to insure efficient care by competent first aid attendants and surgeons.

The unsupervised use of first aid kits or supplies throughout an industrial plant should not be permitted. Centralized first aid stations or dispensaries are preferable in order to insure adequate treatment and records. Employees in all plants should be instructed that when injured they should report promptly to the first aid station or medical department for treatment regardless of how trivial the injury may seem.

Infection in so-called minor injuries is still a problem in industry and constant vigilance will always be required for its control. According to a recent report for the state of New York, 15% of the injured workmen who were compensated were cases of infection.

The first aid attendants should be properly instructed by the physician in charge and they should be under his supervision. Many medical and surgical procedures engaged in by lay first aid attendants are illegal, they render the employer liable to suit, and they endanger the ill or injured workman. Furthermore pre-employment and periodic physical examinations of employees made by lay or nurse first aid attendants are valueless. Certainly such medical procedures in which lay first aid attendants are engaged should be discontinued. Physical examinations should be made by a qualified and licensed medical examiner.

The scope of an industrial medical service should include preventive and curative phases as follows:

1. Pre-employment physical examinations and the indicated periodic health examinations.
2. Efficient care of all industrial injuries and occupational diseases.
3. First aid and advice for employees suffering from non-industrial injuries and illnesses while on duty.
4. Medical supervision of plant sanitation and of all industrial health measures for employees.

In connection with the above outlined scope of service attention is again directed to the fact that outside of reasonable first aid and advice employees suffering from non-industrial injuries and illnesses should be referred to their own family or private physician for further professional care. The industrial physician by acting as a counsellor to the ill employee and by establishing amicable working relationships with the family physician can materially elevate the effectiveness of preventive medicine. On the other hand the industrial physician who solicits patients for his private practice from among the workers whom he serves in the plant, is not only unethical professionally but he thereby betrays his employer and destroys the confidence of the employees in the medical service. Industrial physicians must be unbiased, and if they are in private practice they should obtain their patients on merit. These factors are all taken into consideration in granting approval to an industrial medical service.

"2. *Membership on the medical staff shall be restricted to physicians and surgeons who are (a) graduates from an acceptable medical school, with the degree of Doctor of Medicine, in good standing and licensed to practice in their respective states or provinces, (b) competent in the field of industrial medicine and traumatic surgery, (c) worthy in character and in matters of professional ethics; in the latter connection the practice of the*

* From the Approval Number of the Bulletin of the American College of Surgeons, Vol. 22, No. 5.

division of fees, under any guise whatsoever, shall be prohibited."

This clause of the standard is self explanatory. The physical well-being of the employee is of prime consideration and all matters pertaining to the care of ill or injured workers or the related preventive health measures should be entrusted to a well qualified and licensed graduate of medicine.

"3. *There shall be a system of accurate and complete records filed in an accessible manner, such records to include particularly a report of injury or illness, description of physical findings, treatment, estimated period of disability, end results, as well as other information pertinent to the case or required by statute for workmen's compensation claims or other purposes."*

Most industrialists realize the importance of this requirement. As a result industrial injuries have been very well recorded in industry as a whole; a commendable achievement. Further improvement in record keeping can be made however. Too often no records are made of visits to the dispensary by employees who are suffering from non-industrial injuries and illnesses.

Periodic compilations and analyses of the injury and illness experience and its costs are not yet made by all industrial organizations. Statistical summaries and comparative studies of the injury and illness experience and its costs should be made at intervals. These studies will not only aid in evaluating the efficiency of the medical and safety services but they will also serve to demonstrate future objectives of such services by uncovering any weak points that may exist.

The early surveys made by the College revealed that at least one-third of the pre-employment physical examinations made at that time were not recorded or were so incompletely recorded as to be of no future value. This situation has been largely corrected in the last few years. Now we are finding more complete histories of illness, injury and previous occupations in addition to an adequately recorded physical examination. This is as it should be. After reviewing thousands of record forms used in industry the American College of Surgeons has recently formulated a series of pre-employment and periodic health examination record forms, samples of which may be obtained by writing to the College.

Physical examination records of employees should be treated as confidential information and should be filed under medical supervision and responsibility. These records should not be filed with the employment records or in the employment department. They should be filed in the medical department in order to provide records which are readily accessible to the physician for re-examinations and follow-up purposes, and in order to maintain the confidence of the employees in the medical service. Physical examination records should not be released to other industrial organizations.

"4. *Patients requiring hospitalization shall be sent to institutions approved by the American College of Surgeons."*

It is of utmost importance to the employer and to the injured employee that they be assured of adequate care when hospitalization is needed. Since 1918 the American College of Surgeons has been engaged in the standardization of hospitals in the United States and Canada. A Minimum Standard for Hospitals was formulated which was adaptable to all types and sizes of institutions caring for the sick and injured. Hospitals have made splendid progress in carrying out these requirements, not only because the public has demanded better service but also because the Minimum Standard has aided in establishing a better environment for the physician and his co-workers in rendering better care to the patient. To date there are 2,621 approved hospitals in the United States and Canada.

"5 *The medical department or service shall have general supervision over the sanitation of the plant and the health of all employees."*

Obviously medical matters in industry should be delegated to competent medical hands. State supreme courts have ruled to the effect that corporations cannot practice medicine. This service should only be rendered by those properly qualified and licensed according to the law. The workmen's compensation law of New York specifies that all first aid stations or clinics participating in the treatment of industrial injuries must have medical supervision.

Industrial physicians should formulate and sign standing orders for the first aid or medical service in the plants which they serve. These regulations should be posted in the plant's first aid room or dispensary for guidance of first aid attendants.

Periodic visits to the plant should be made by the physician to insure compliance with these regulations. Periodic inspection trips through the plant should also be made in cooperation with the safety and engineering departments in order to ascertain working conditions and to control or eliminate all health hazards. It is the duty of the physician to determine the presence or absence of a health hazard; the engineer is charged with its elimination or control. Written reports of inspections including the indicated recommendations should be made to the proper plant official.

The industrial physician should be informed as to the ingredients in all of the materials and also of the various processes that are used in the plant. A knowledge of industrial toxicology is becoming more and more urgent. It is far better to adopt an anticipatory attitude and to investigate all new industrial processes that are contemplated and that may have harmful effects upon the workers rather than to proceed blindly and later to have the cost of compensation and compensation laws force the adoption of remedial or preventive measures.

Each industrial organization should have a medical director. It is of utmost importance, however, that the employer confer authority upon the physician who is entrusted with the responsibility for the medical service. In turn the medical director should be expected to exercise his prerogatives, to establish amicable interdepartmental working relationships, and to produce results.

Such organization is the key to obtaining that type of ethical and efficient medical service which will play an important role in effecting "security" for both employer and employee.

THE foregoing may be crystallized into a yardstick as follows:

AN ADEQUATE INDUSTRIAL MEDICAL SERVICE REQUIRES:

1. A definitely organized plan for the medical service.
2. A definitely designated staff of qualified physicians, surgeons, and attendants.
3. Adequate emergency, dispensary, and hospital facilities.
4. Pre-employment and periodic physical examinations—to be made only by qualified medical examiners.
5. Efficient care of all industrial injuries and occupational diseases.
6. Reasonable first aid and advice for employees suffering from non-industrial injuries and illnesses while on duty.
7. Education of the employee in accident prevention and personal hygiene.
8. Elimination or control of all health hazards.
9. Adequate medical records, accessibly filed in the medical department under responsible medical supervision.
10. Supervision of plant sanitation and all health measures for employees by the physician or surgeon in charge.
11. An ethical and cooperative relationship with the family physician.
12. The use of approved hospitals.

Important New Books

Reviews by

C. O. SAPPINGTON, M.D., DR.P.H.

Management of Fractures, Dislocations, Sprains

THE 1934 edition of this book was reviewed in the February, 1936, issue of INDUSTRIAL MEDICINE.

In the second edition, of 1937, 1,002 pages have been added to the volume—the authors, JOHN ALBERT KEY, B.S., M.D., and H. EARLE CONWELL, M.D., F.A.C.S., state: "In this edition we have incorporated those additions and changes in our methods of diagnosing and treating fractures which since the publication of the first edition we have found beneficial and which we believe sufficiently important and well tested to warrant publication in a textbook. The most extensive changes are those in the treatment of fractures of the spine and the hip. However, every chapter has been carefully reviewed and many changes with numerous substitutions have been made."

As before, the book is divided into two parts, Part I being on principles and general considerations, including chapters on general considerations; repair of fractures; principles of treatment of fractures; first aid in fractures in automobile injuries; complications of fractures; pathologic fractures; compound fractures; dislocations; the workmen's compensation law affecting fracture cases; and medicolegal aspects of fracture cases. Part II, on diagnosis and treatment of specific injuries, contains material on fractures of the skull and brain trauma; fractures of the jaw and related bones of the face; injuries of the spine; fractures and dislocations of the hyoid, larynx, and tracheal cartilages; injuries of the thorax; injuries in the region of the shoulder girdle and shoulder; fractures of the shaft of the humerus; fractures in the region of the elbow; fractures of the forearm; injuries in the region of the wrist and hand; fractures and dislocations of the pelvis; injuries in the region of the hip; fractures of the shaft of the femur; injuries in the region of the knee joint; fractures of the shafts of the tibia and fibula; injuries in the region of the ankle; and injuries of the foot.

Again good use has been made of discussion of the surgical anatomy of various portions of the body as applied to injuries and fractures of the various locations. This is of especial value to the surgeon in considering the etiology of fractures, as well as for the indications relative to treatment. There has been no work nor expense spared in preparing profuse illustrative material, including drawings, diagrams, photographs of appliances, and methods of treatment, as well as x-ray reproductions and numerous figures which enhance the value of the text.

The chapters on workmen's compensation law and medicolegal aspects of fracture cases should be of especial value to traumatic surgeons, as well as suggestions regarding tabulations, adequate records, the estimation of disability, relation of doctor to patient, avoidance and defense of malpractice suits, and other pertinent discussion.

The volume as a whole should be of very practical use to all traumatic surgeons and to others who are interested in such cases. It contains 1,246 pages, was published by the C. V. Mosby Company, St. Louis, Missouri, in 1937, and is priced at $12.50.

Recent Advances, Industrial Hygiene and Medicine

THIS BOOK by a British author, DR. T. M. LING, analyzes the progress made in the field of industrial hygiene and medicine, being very largely a report of the British experience, but also including some American references.

The material includes information in medical supervision of workers—industrial sickness—industrial accidents—the neuroses of industry—industrial fatigue—ventilation—industrial lighting—dust and its effects—noise—lead poisoning—toxic effects of gases—industrial dermatoses. An interesting kind of material is included in the appendix, consisting of duties of and ethical rules for industrial medical officers as formulated by the British Medical Association, because of an increasing number of physicians who hold positions

either whole time or part time with commercial concerns.

As expressed in the author's preface: "At the beginning of the century, industrial medicine meant little more than what are now called the occupational diseases as scheduled under the Workmen's Compensation Acts, but today the connotation of the subject has come to mean a much more extensive field of study, drawing its main inspiration from contemporary physiology and psychology."

Inasmuch as the title indicates that the material is composed of "Recent Advances," it cannot be expected that the book will include even an exhaustive treatment of the development of any particular subject in the various chapter headings. To those who are acquainted with the subject of industrial medicine and hygiene, this small volume of 212 pages will be of considerable value in getting facts and figures perhaps otherwise unobtainable.

The book was published in 1937 by P. Blakiston's Son & Co., Inc., Philadelphia, and is priced at $3.50.

Clinical Roentgenology, Cardiovascular System

THIS excellent treatise by Dr. Hugo Roesler, Associate Professor of Roentgenology and Cardiologist of Temple University School of Medicine, Philadelphia, presents material on the anatomy, physiology, pathology, experiments and clinical applications of the subject.

The author has drawn freely on international clinical material and has considered well-selected information under the headings of technique—anatomy and roentgenology — normal cardiovascular system, static—measurement—dynamics of the normal cardiovascular system—anatomical-clinical-roentgenological considerations — cardiovascular disease from the viewpoint of etiology—cardiovascular disease from the viewpoint of structural changes—diseases of the aorta—diseases of the pulmonary artery and of its branches—pericardial disease—congenital cardiovascular malformations—disorders of cardic rhythm, rate, contraction—and peripheral vascular disease.

Diagrams, graphs, reproductions of x-ray films, and special tracings have been freely used with good effects. A feature of the book is a well-selected bibliography at the end of each chapter with the chapter heading included at the head of the list of references. A certain group of textbooks is also listed at the end of the book.

This work should form an essential part of the library of the roentgenologist, as a part of the armamentarium of every specialist on chest disease, and an ever-present help to the cardiologist. It appeals, especially in these times, to the industrial physician and surgeon who must be able to distinguish between true occupational disease of the chest and that which is non-occupational.

The book contains 343 pages, was published by Charles C. Thomas, Springfield, Illinois, and Baltimore, Maryland, in 1937, and is priced at $7.50.

Crippled Children

THIS WORK has particular reference to the treatment and the principles of orthopedic nursing, and was written by Dr. Earl D. McBride, Assistant Professor of Orthopedic Surgery, Oklahoma School of Medicine, in collaboration with Winifred R. Sink, R.N., Educational Director of the Grace Hospital School of Nursing, Detroit, Michigan.

As the senior author said in his preface to the first edition:

"The purpose of this volume is to supply those interested in the care and treatment of crippled children with such knowledge and information as the orthopedic surgeon would deem advantagoeus to have presented to them.

"The information is directed to serve as an instructor for the nurse in her training and practice. In addition to the services of the nurse, however, responsibility for the success of the surgeon's work depends largely upon the degree of cooperation of the social workers and parents so that they should also have a reliable source of information available to them.

"Orthopedic textbooks are too technical to answer this purpose, while verbal instruction at its best is but fragmentary and open to misunderstanding. It is hoped, therefore, that the orthopedic surgeon, the nurse and crippled children's societies will find this book useful in imparting knowledge to those of unscientific training who are interested in the relief of deformities and physical handicaps—especially of children."

Painstaking attention to detail is the principle around which all of the information has been set down.

The variety of subjects is impressive: orthopedic equipment—technic for nurses in surgical orthopedics — postoperative nursing duties — instructions to the patient leaving the hospital as to when to return to the doctor — plaster of Paris technic — adhesive plaster — application of traction—physical therapy—braces and their care—infantile paralysis—cerebral spastic paralysis—obstetric paralysis—progressive muscular dystrophy—Friedreich's ataxia—growing pains—rheumatism — joint tuberculosis — abscesses — tuberculosis of the spine—tuberculosis of the hip—tuberculosis of the knee and other joints—how to tell when one leg is longer than the other—Perthes' disease — syphilis — acute hematogenous osteomyelitis—rickets—bowlegs and knock-knees—curvature of the spine—postural conditions of the feet—congenital and hereditary anomalies—injuries—rupture—tumors—and amusement and occupation for the orthopedic patient.

The book should have an immediate appeal to those surgeons whose interest lies in the minutiae of orthopedic technique and after-treatment; and should be of especial value in helping to present the proper point of view to laymen.

This second edition contains 379 pages, was published by C. V. Mosby Company, St. Louis, Missouri, in 1937, and is priced at $3.50.

Sciatica and Fibrositis

—Historical and Recent Cults, Theories, and Facts as to Etiology, Diagnosis, and Treatment—

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FOR the sake of clarity the following brief gives in advance the basic views expressed in this article, which are at variance with much of the medical literature and current views held by the profession.*

1. Fibrositis is an affection of bursae, sheaths, tendons, fascias, ligaments, and interstitial tissues of the muscles.

2. Sciatica and many other pains about the various joints and fibrous tissues of the skeletal system are manifestations of fibrositis.

3. Sciatica is not sciatic neuritis.

4. Sciatica is often wrongly diagnosed as a sacro-iliac affection.

DERIVATION: In Greek the word ischion (from ischos)—Latin ischium—meant primarily the hip joint socket or acetabulum.

Secondarily it meant the hip joint, and in the plural the hips or loins. Like the word loins, ischia was used vaguely for the lumbar region and hips.

A noun derivative ischios (ischiados) meant pain in the hip, or sciatica. From this term was derived the adjective ischiadikos, Latin ischiadicus or ischiaticus, meaning relating to the hip, or with nosos, disease, understood as meaning affected with pain in the loin or hip.

In late Latin ischiaticus became sciaticus, and in French sciatique. In new Latin the feminine adjectve sciatica was used as a noun in its present sense.

DEFINITION: Sciatica means an ailment causing pain in the hip region located usually between the greater trochanter and the ischial tuberosity. It may extend down the back of the thigh and to the peroneal part of the calf, or up to the lumbar region. The above definition is the essential meaning of the word sciatica and its latinized Greek antecedent ischiadicus as used throughout history.

Recent lexicons and textbooks furnish varying and obscure definitions which do not define. They generally contain the above idea of sciatica as influenced by false and fantastic conceptions of its etiology.

The word sciatica used in the sense of a nerve affection is a historical impropriety. From the time of Hippocrates down to Cotugno's publication in 1770 there was no suggestion of sciatica being a nerve affection. It was nearly a century after this publication when the idea of a neuritis was put into dictionaries.

Samuel Johnson's Dictionary (1775) and Todd's improved edition (1828) made no mention of the nerve affection.

Thomas' medical dictionary (1864) gives two meanings:

1. Rheumatic affection of the hip; 2. Neuralgia of the nerve.

Century (1900) gives the nerve affection only.

Webster (1933) gives two meanings:

1. The nerve affection;

2. Popularly, affections of the hip and adjoining parts.

The complete Oxford gives quotations from 1450 to 1839 none of which concerns the nerve; then, in 1866, Flint is quoted with the idea of a nerve affection.

The only excuse for using the word sciatica in the sense of a nerve affection is that it has been so used by some during the last 60 years in support of a false theory or cult. If the dictionaries continue to define sciatica as a nerve affection it may become necesary to use the term sciatic fibrositis to leave no question as to what is meant.

It should be noted that the term sciatica does not take its name from the sciatic nerve, but both sciatica or hip pain and the sciatic or hip nerve get their names from the ischiatic, sciatic, of hip bone with which they are associated.

Sciatic neuralgia and ischialga have been used as synonyms of sciatica. If we take the Greek veil from neuralgia it means nerve pain which is inaccurate.

Sciatic rheumatism is used by those who regard rheumatism as meaning any vague unexplained pain anywhere in the skeletal system.

Sciatic neuritis is commonly used as a synonym for sciatica. It is an old fallacy. The word neuritis implies inflammation of the nerve. Sciatica as commonly recognized is no more of a neuritis than toothache or any other painful condition.

These views may sound strange to those who read our present-day medical journals and listen to talks by orthopedists and neurologists, but these very same views have been repeatedly expressed during various eras by the great men of our profession who have not been led astray by a few eminent cultists.

Historical and Modern Views and Cults

HIPPOCRATES, according to the French translation by Littré, 1861, defined sciatica by saying that in the hip-ache the pain is located at the joint of the ischium, the tuberosity, and the buttock; finally it progresses throughout the lower limb.

He remarks that perhaps as a result of some other illness the humors in the blood settle in the

* Presented at the Annual Meeting of the Association for the Advancement of Industrial Medicine and Surgery, New York City, December 15, 1937.

vein and progress through the vein the length of the lower limb.

He treated with hot applications, purgatives, and local cauterization.

He also used moxa, a downy vegetable substance which was burned on the painful spot causing a light burning or vesication of the skin. This use of moxa has continued to modern times.

Domenico Catugno (1736-1822) was a Neapolitan anatomist and physician. His name was latinized to Cotunnius.

Up to this time sciatica was regarded as above defined and often qualified by such vague terms as neuralgic, rheumatic, or gouty. He taught that sciatica was due to an acrid humor which formed in the brain, descended along the spinal cord, and spread out through the nerve sheaths. He practiced cupping, leeching, and blistering along the course of the sciatic nerve with a view to evacuating this humor.

When light blistering failed, the raw spots were further irritated until a free flow of pus was obtained. This was accepted as evidence that the humor was being removed. He fancied that sciatica was a disease of the sciatic nerve.

His views were based on the humoral doctrine of the Greeks as applied to his anatomical dissections. This idea became a cult, and many old authors used the term malum Cotunii, or Cotugno's disease, for sciatica. This notion was in vogue for many years with the medical profession and its influence is still manifest with those who still think of sciatica as a neuritis.

Valleix (1807-1855) was prominent among the mystic-minded neurologists of his time. He enlarged upon the neuritis idea. The tender points of Valleix are still found in textbooks.

They are supposed to indicate neuritis or neuralgia when pain on pressure is found at these points. Apropos of this William Bruce says: "I have rarely found the tender points of the books."

Hugh T. Patrick says, "the classical points of Valleix are a delusion and a snare . . . if one firmly punches the gluteal point, the femoral point, the popliteal point, and the submalleolar point, frequently one or more of them will be seen to be tender. Other unrelated points may also be tender."

Another cult on the treatment of sciatica was endorsed and practiced by Valleix. It consisted of cauterizing the ear, generally at the helix. It was based on an alleged practice of Hippocrates. It was destroyed by Landsberg, of Breslau, in 1851 when he showed that it was based on a mistranslation of Hippocrates in a passage which recommended local cauterization for inflammation of the genitalia together with bleeding from the jugular vein near the ear.

This cult grew actively during the thirties, had its climax during the forties, and dwindled during the fifties.

The Sacro-iliac Cult

THE sacro-iliac idea had its origin about 1905 and it spread among orthopedists until the World War when it was popularized with the general profession. In cases formerly called sciatica they went as far as to diagnose sacro-liac dislocation due to alleged relaxation of the ligaments in cases with neither serious trauma nor destructive bone disease. These diagnoses propounded by the adherents of this ill-conceived cult have no reason for existence in the rational practice of medicine, yet it has happened that a general practitioner diagnosed sciatica and the case got into the hands of an orthopedist who diagnosed sacro-iliac dislocation. Then the practitioner found himself sued for malpractice for failing to recognize a dislocation which never existed.

Many surgeons admit that they have never seen a case of dislocated or even loose sacro-iliac joint except in cases of severe trauma. In spite of inductive negative evidence which is overwhelming, a group of orthopedists continue to make bold-faced assertions about sacro-iliac dislocation.

These gentlemen are not the lowly quacks.

They are among the most prominent and powerful in medical politics, and hold high offices among the interlocking directorates of our great hospitals.

During the present century some orthopedists acting as regulars within the profession have developed a vicious system of misinterpretations concerning the sacro-iliac articulation into a virtual cult which rational medical men fear and scorn, more so than the less subtle cults of osteopathy and chiropractic.

It cannot be said of the sacro-iliac cult that it does no harm, because it has given rise to the sacro-iliac fusion operation which usually causes permanent disability for labor.

During the last few years the sacro-iliac "fusionists" have found several rivals in operations for the relief of sciatic symptoms.

In 1934 there appeared an operation in which there was a denudation of the ligamentous and muscular attachments from the lateral posterior third of the ilium and the posterior superior spine.

In 1935 an operation appeared which consists of cutting the iliotibial band transversely at a level between the crest of the ilium and the trochanter. This relaxes the iliotibial band the contraction of which is supposed to cause sciatica and lumbago.

In the present year of 1937 still another operation in this series has bloomed forth. It consists of excision of a section of the piriformis muscles which is also supposed to relieve sciatica. It is based on the supposition that the muscle lying over the sciatic nerve causes pressure resulting in symptoms.

This idea is offered as new, but it is an old idea presented in 1908, by Barshinger—who had the grace, however, not to try the operation on a human subject.

I have seen the late results in nearly a hundred sacro-iliac fusion operations, a dozen iliotibial band sections, and a few each of denudations of the posterior ilium and piriformis muscle sections. I could not see justification in any of them.

The Nature of Sciatica

FIBROSITIS affects the attachments to joints in inverse proportion to the size of the joints and the power exerted on them. Thus the hip and lumbar region are most prominently affected.

Thomas Inman (1861) recognized these facts when he wrote: "sciatica is a name given to a pain about the hip, respecting which our knowledge is not precise."

He discarded the commonly used terms "rheumatic" and "neuralgia" as being too vague.

He cites many facts, and concludes: "All these point to muscles and tendons or fascias as being very generally, if not invariably, the seat of the pain." Lumbago and sciatica were looked upon as one and the same disease affecting adjoining regions and often both at the same time. With this in view lumbago with or without sciatica was spoken of as Inman's disease.

Jonathan Hutchinson (1882) wrote: "In 19 cases out of 20 in which the diagnosis of 'sciatica' is suggested there is no affection of the sciatic nerve whatever. . . . Of the cases of 'sciatica' which are not hip joint rheumatism, some are probably affections of the fascia or periosteum near to the hip; a minority are possibly affections of the sciatic nerve itself. . . . Examples of this are decidedly rare, and their recognition without risk of error is a matter of great difficulty."

Hutchinson uses the term "true sciatica" in the sense of an affection of the sciatic nerve. Such a meaning is unwarranted by historical use or the derivation of the word. Otherwise he confirms the views of Inman.

William Bruce (1903) says: "I think it may be fairly said that sciatica is some affection of the hip-joint and not neuritis of the sciatic nerve. . . . It has also to be remembered that the nerve supply of these (gluteal) muscles comes not from the sciatic nerve but from the sacral plexus. . . . Again, even those who speak of sciatica as being a true neuritis are forced to allow that the electrical reaction of degeneration of the muscles is never present. . . . We have seen that there is no proof of any real neuritis of the sciatic nerve."

William R. Gowers (1904) says: "The afferent nerves of muscles end or begin . . . in a manner quite different from the motor nerves. Instead of terminating in the muscular fibers, as do the latter, they end in the interstitial tissue between the fibers, and the only ending which has yet been generally found is in the remarkable bodies called 'muscle spindles'.

"As far as we know, all afferent impulses from muscles arise in these, including the pain of cramp and the peculiar pains of lumbago and the allied affections. . . .

"These peculiar bodies seem to belong to the fibrous tissue of the muscle, to that which sheathes and connects the muscular fibers, rather than to the latter.

"We have another important proof that the malady is an affection of the fibrous tissue; it may spread, and it spreads by continuity of this tissue. It spreads to the tendinous attachments of the muscles to the crest of the iliac bone and the back of the sacrum. . . . This tendinous tissue contains nerve endings, which resemble the muscle spindles. . . . Such morbid sensitivenes of the tendinous structures of the back of the sacrum—'sacral lumbago'—spreads, apparently by the fasciae, and reaches the sheath of the sciatic nerve. There it may increase to definite sciatic neuritis.

"We may conveniently follow the analogy of 'cellulitis' and call it 'fibrositis'. . . ."

Hugh T. Patrick (1917) wrote, "I believe sciatica to be a relatively rare disease, while arthritis of the hip is one of the most common." He also misused the word "sciatica" in the sense of sciatic neuritis. He further writes: " . . . of patients referred to me supposedly with brachial neuritis, only about one in 10 really had it." Most of them were arthritis or bursitis of the shoulder.

These quotations show that although the profession was prone to adopt cults there were usually some clear thinkers who protested and pointed out errors, but they were generally unheeded. A fair study of the subject is convincing that sciatica does not belong to the field of either the neurologist or orthopedist. It belongs to the field of the general practitioner. The only specialist who might have a claim on sciatica would be the specialist in metabolism with its allied subjects, allergy, vitamins, and endocrines.

Tissues and Structures Affected

THE fibrous structures are the ones specifically affected in sciatica and cognate ailments in other parts of the skeletal system.

Microscopically we find numerous sensory nerve endings in the synovial membranes where the ligaments are attached to the periosteum and at the junctions of the tendons with the muscles. There is also a fine network of sensory nerves throughout the tendons and ligaments. These microscopic findings correspond to clinical findings. While the pain is of a shifting character and the patient may be vague in locating it, the usual seat of pain will be found where the tendon is attached to the bone or muscle.

The muscles have been held by some to be the seat of these painful affections. Hence we have the names myalgia, muscular rheumatism, myositis, and myofascitis. The muscles do not seem to be painful as the tendons. Thus a patient with a ruptured tendon of the plantaris muscle complains more of pain than one with a large rupture of the gastrocnemius muscle tissues.

The demonstrated nerve connections with muscle cells are motor fibers. The sensory fibers are few and seem to terminate at the surface of the muscle cell. It is questionable if there is any pain from the muscle fiber cells.

Subcutaneous nodules have received much attention from English physiotherapists. Some assert that these nodules contain a gelatinous substance with leucocytic infiltration. This condition has been called myogelosis. Its most frequent location is at the tendinous attachments over the lumbosacral region. It is alleged that this form

of fibrositis may be readily cured by thumping these nodules. Then, "presto", the broken down nodule liberates infected material which entering the circulation acts as a vaccine. The significance of such nodules has not been determined. They seem to occur about as frequently in the absence of as in the presence of sciatic symptoms. It has been suggested that they may be related to hypothyroidism because of their presence in persons inclined to myxedema.

Stockman examined nodules in the buttocks and found them to consist of fibrous tissue. Coates, in 1931, performed biopsies on gluteal nodules and found them to consist of fat located not in the muscle but in the subsutaneous tissue.

In cases of painful lumbosacral joints, especially in spondylolisthesis, I have repeatedly found apparent nodules one to two centimeters in diameter symmetrically located in the spaces between the sacrum, ilium, and fifth lumbar vertebra. These apparent nodules which fluctuate on palpation are presumably distended bursae.

Bursitis is more common than is generally realized as a cause of sciatic pain. Synnestredt counts 21 bursae about the hip joint. There are three large ones which are important clinically and numerous smaller ones.

The greater trochanteric bursa lies behind the trochanter and under the middle of the tendinous part of the gluteus maximus near its insertion. Affection of this bursa has been mistaken for hip disease.

The ischial bursa at the tuberosity of the ischium is covered by the gluteus maximus while standing and by the fascia while sitting. When inflamed it has been known as coachman's bursa and weaver's bottom, both of which are occupational diseases. Sometimes this bursa is united with the one at the head of the biceps femoris. Fournier records gonorrhea as a cause of ischial bursitis with sciatica.

The iliopsoas bursa, sometimes called the iliopectineal, bursa, lies under the tendon as it leaves the pelvis and attaches to the iliofemoral ligament. Sometimes the bursa communicates with the hip joint. Inflammation of this bursa is often mistaken for anterior crural neuritis. It has also been wrongly diagnosed and operated upon for femoral hernia and psoas abscess.

The bursae are all intimately connected with the region of sciatic pain and they are an important factor in producing symptoms. It is usually said that pressure over the sciatic notch causes pain because of the sciatic nerve being affected. This is a fiction. More careful palpating pressure will show that the pain is located about the bursae where the tendons are attached to the bones.

Fibrositis as a Clinical Entity

THE fibrositis idea originated with Inman's work in 1861. It has had a gradual growth since then. Gowers coined the word in 1903. Mostly British writers have dealt with the subject, but they have had varying conceptions as to the sphere which it includes. The ailments which may be classified as fibrositis with reasonable certainty are: stiff neck, painful shoulder, epicondylitis, pleurodynia, lumbago, sciatica, coccygodynia, tendon and bursitis affections about the knee, and tendo-Achillis synovitis. All of these conditions concern fibrous tissue and bursae in positions subject to strain. They all may be initiated or aggravated by: chilly wet weather, trauma, infections, and indiscretions of diet with their metabolic sequels.

Several writers have noted the anology between gout and fibrositis.

Lumbago, a painful condition of the lumbar region, is of the same nature as sciatica and usually associated with it.

Coccygodynia, like lumbago, is an adjunct to sciatica. The same treatments used for sciatica and lumbago are useful in coccygodynia. In persistent cases excision of the coccyx is resorted to. In most cases the results are nil and the pain continues after the operation. More satisfactory results have been obtained by such operations as stretching a strictured urethra or operations for hemorrhoids, fissure, and fistula.

Torticollis, or wry-neck, is a spasmodic painful condition of one side of the neck. There are many causes of chronic wry-neck which make an etiological diagnosis difficult, but the acute stiff neck which comes on after indiscretions of diet, exercise and exposure should be classified with fibrositis and treated in the same way.

Painful shoulder with pain extending down the arm is often diagnosed brachial neuritis or neuralgia. Patrick states that it is seldom associated with a neuritis but usually an arthritis. These pains in the shouuder resembling sciatic pains are almost always accompanied by subdeltoid or subacromial bursitis and affections of tendon, fascia and periosteum. Codman has shown that a considerable proportion of them are a sequel to rupture of the supraspinatus tendon. This suggests the question: "How often is a tendon ruptured in the deep part of the hip with no external signs?"

Etiology and Relationship to Other Conditions

GOUT was frequently held to be the cause of sciatica during previous centuries, and it was sometimes called ischiagra. Malnutrition and faulty metabolism were recognized as causal factors in both sciatica and gout. The word gout like many other medical words was used in an obscure sense. Caelius Aurelianus recognized the tophus as a sign of podagra and held it to be a disease of the tendons and ligaments. Many gouty patients have sciatica but relatively few sciatica patients have gout in demonstrable form.

Vitamin deficiency is a frequent cause of sciatica. Strambio (1794) noted sciatica as a prominent symptom of pellagra.

Allergy may cause sciatica which is usually brought on by the foods to which the patient is susceptible. A simple milk diet often brings about improvement.

Endocrine: Hypothyroidism manifsted by low metabolism has been reported by Beall (1928) in

several cases of sciatica which were cleared up by the use of thyroid extract.

PANNICULITIS or painful fat is a chronic subcutaneous fibrositis which Ackerley believes to be a minor degree of adiposis dolorosa. It appears in the form of flat cakes of fat suggesting a flattened out lipoma. He gets good results with diet and the administration of thyroid extract.

FOCAL infections such as affect sinuses, teeth, tonsils, prostate, gall-bladder, and intestine, through their toxins may be productive of sciatica.

AFFECTIONS of blood vessels: Calcareous degeneration of the aorta has been noted as a cause of backache and sciatica.

Ridlon and Berkheiser (1923) after observing painful backs due to disease of the aorta make the following pertinent remarks: "The treatment of many painful backs ought to be directed by the internist and not by the orthopedist. The routine employment of girdles, braces and plaster jackets and extension in bed is worthy of our earnest skepticism in the treatment of painful backs."

TRAUMA may be a primary or secondary factor in aggravating or contributing to sciatica. As such it has medicolegal importance. Any severe injury to the hip region or adjacent parts may cause sciatica with its subsidary ailments lumbago and coccygodynia. Such injury may be in the nature of fracture dislocation, contusion, sprain, or strain. An important fact is that a serious injury to the hip region may clear up in a short time, leaving little or no symptoms. Years later a sciatica may develop at this locus minoris resistentiae.

WEATHER: Patients with pains vaguely called neuralgic, myalgic, and arthralgic are sensitive to an approaching storm.

The sciatic patient prefers sweltering humidity to cold weather. He finds that sweating is good for him. He stands the dry heat well, and he stands the dry cold fairly well when properly dressed. Wet, cold, and windy weather is his bane.

GASTRO-INTESTINAL: H. W. Fuller (1852) holds that an unhealthy loading of the lower bowel causes sciatica by mechanical pressure in the pelvis. This may be a factor, but much more important is the absorption of poisons from a putrefactive intestine whether constipated or not.

UROLOGY: Fuller also noted that nephritic irritation from stone sometimes caused sciatica in addition to the classical symptoms of pain in the genitals on the same side. Haines (1931) noted that renal and ureteral calculus may simulate sciatica. Stricture of the ureter with its secuelae causing vague loin pains may also be accompanied by sciatica. Monroe (1901) records two cases of coccygodynia cured by dilation of urethral stricture.

MALE GENITAL ORGANS: A. Fournier recognized gonorrhea as a cause of sciatica which occurred with or without gonorrheal rheumatism, and he noted that it was influenced by anti-gonorrheal treatment.

H. H. Young, T. McCrea, and W. C. Bryant find sciatica and lumbago to be a common symptom of prostatitis. Morris *et al.* find 80% of low backache in men as having origin in the prostate and vesicles, also that it usually takes the form of sciatica, more rarely affecting the inner aspect of the thigh and groin. Boies recognizes prostatic focal infection as a common cause of low back pain. He also observes that no orthopedic procedure is justifiable in back injuries with objective findings as long as the prostate gives evidence of infection.

FEMALE PELVIC ORGANS: Williams says: "I have seen a case of the latter character (sciatica) which had persisted for years in spite of continuous treatment, disappear as if by magic after laparotomy and the separation of the adherent appendages from the posterior and lateral portions of the pelvic wall."

In recent years there have been numerous reports on the relief of pain in the pelvis and lower extremeties by excision of the superior hypogastric plexus, also called the presacral nerve. This seems to throw some light on the relief of pain by gynecological operations in which sympathetic nerves are severed.

Neurology

NEURITIS is a much abused term. The peripheral nerves of which the sciatic is the greatest may become affected with neuritis. It rarely affects the sciatic nerves and when it does it is usually bilateral. Painful neuritis is not nearly as common as current diagnoses would have one believe. Hutchinson, Inman, Bruce, Solis-Cohen, and Patrick all agree that most cases called neuritis are mistaken diagnoses of some other painful condition. Sciatic neuritis may exist without pain, which means without sciatica. Codman speaks of the sensitization of traumatized areas. This is frequently called neuritis.

Bilateral sciatica is a term often used for what should be called bilateral sciatic neuritis. It is generally recognized that these cases are associated with systemic disease. Syphilis, diabetes mellitus, beri-beri, leprosy, and numerous poisons are well known systemic causes of neuritis. These diseases have anesthesia and paralysis as much more prominent symptoms than pain. The diagnosis of neuritis with only pain and atrophy from disuse is not warranted.

Syphilis may be accompanied by pains in various muscle groups, but its favorite location is the low back. Neuritic pains may extend down the back of both thighs, making the condition which Fournier calls "preataxic double sciatica".

W. Alexander (1912) says that he never found sciatica in a tabetic and that the pain in tabes is bilateral and independent of movements. Instead of Lasegue's sign there is hypotonicity without pain.

Orthopedics

SYMPTOMS of lumbago or sciatica may follow disease or injury to the bodies of the lumbar vertebrae. The conditions are: (1) Simple frac-

ture; (2) Kuemmell's rarefying osteitis following injury; (3) Marie-Strumpell's disease, or spondylosis deformans; (4) Bechterew's disease, an ankylosis of the vertebrae with ossification of the anterior longitudinal ligament; (5) Scheuermann's disease, which belongs to the group called osteochondritis deformans juvenilis and is often associated with Schmorl's nodules; (6) Paget's disease; (7) Osteitis fibrosa cystica (Recklinghausen). Also the following diseases may cause spondylitis with its train of low back symptoms: typhoid and Malta fevers, syphilis, tuberculosis, many fungous diseases, tumor metatases and infestation with echinococcus cyst and round worm spiroptera.

Trauma to the intervertebral disks is a cause for obscure backache which has only been recognized in recent years. Several cases have been reported in which the damage was caused by the needle in spinal puncture. The cartilage being damaged may permit the protrusion of a hernia of the nucleus pulposus. Hernia into the spinal canal may cause cord symptoms. Callus-like proliferations of cartilage called Schmorl's nodes may penetrate the spongiosa of the vertebral body. In time the damaged cartilage may disappear, and the x-ray will show absence of space between the vertebral bodies.

Fractures of the transverse processes may occur from direct or indirect trauma. The processes are intimately connected with the erector spinae and iliopsoas muscles.

These fractures throw some light on the explanation of manipulative signs. In such cases Patrick's sign is often negative, while Lasegue's sign is strongly positive and persists for a year or two. This harmonizes with the view that Patrick's sign is concerned with essential hip movements while Lasegue's concerns, at least partly, the action of the iliopsoas muscles.

Fractures of the laminae are unusual, but when present often cause cord symptoms. Lines between separate centers of ossification are often difficult to distinguish from fracture in x-ray pictures. These conditions are especially noteworthy in spondylolisthesis. Fractures of the articulating processes offer similar difficulty. Some believe that subluxation of these processes is the common cause of sudden "crick" in the back.

Neugebauer (1882) made a comprehensive study of spondylolisthesis. He observed that it is a congenital condition due to lack of union of the ossification centers of the laminae. This permits the weight of the vertebral column above to crush and disintegrate the laminae which form the bridge between the body and spinous process of the vertebra. The condition is not necessarily disabling, for athletes have been known to carry on with this defect. However even a mild trauma may change a tolerable condition to a disabling one. There may or may not be symptoms of pressure of the nerve roots, but there are nearly always some of the signs shown by manipulation tests for sciatica and lumbago.

The sacro-iliac joints have been made much of by the cultists. They are bound by such powerful ligaments that they cannot be dislocated without a catastrophic accident which also causes a fractured pelvis.

I have seen several cases with fracture and dislocation of the sacro-iliac joints which failed to show the alleged sacro-iliac symptoms.

Hip joint inflammation is called coxitis. Sciatica is pain in the hip due to inflammation of the hip outside of the hip joint. A sharp blow on the heel of the extended leg will cause pain in coxitis but not in sciatica.

A tilting of the pelvis may be due to actual shortening of a leg or apparent shortening due to posture. The tilting produces scoliosis and the strained position causes sciatica. Alternating sciatica and scoliosis occur when the formerly sound hip becomes painful due to strain thrown on it by posture.

Symptoms

THERE are pain and tenderness in the mid-gluteal region. It may extend down along the linea aspera and fibula or to the lumbar region and Scarpa's triagle.

In the acute stage abdominal pressure from coughing, sneezing, or defecation may cause pain. There is present coated tongue, slight fever eosinophilia, and marked indicanuria.

Muscle spasm of the lumbar erector spinae muscles is rare and only occurs in acute conditions of the affected side. It is like the spasm over McBurney's point in appendicitis. A compensatory contraction, and later a protective hypertrophy of the lumbar muscles on the unaffected side, is often mistaken for muscle spasm.

The buttock on the affected side may be atrophied or it may be flat and flabby. This condition is more noticeable when the patient lies prone. The healthy buttock may resemble a well baked loaf of bread while the affected one resembles dough. Palpation shows loss of muscle tone on the affected side.

The gluteal groove may be partly obliterated on the affected side. It is then lower on the thigh than the corresponding groove. It is also shallower and shorter in a transverse direction. The groove is sometimes doubled with a flabby area between the grooves resembling a double chin.

The thigh may be swollen in acute cases or atrophied in chronic cases. Hypothermia about the knee and calf may be noticeable.

Reflex signs below the waist line may be increased in acute conditions and decreased in chronic conditions. The more important ones are the abdominal, cremasteric, gluteal, knee jerk, and tendo-Achillis reflexes. The absence of any of these reflexes does not prove a nerve affection as some believe.

Diagnostic Signs by Manipulative Tests

THESE signs are usually known by the names of their authors. There is much controversy about the explanation of these signs. The cause

of the controversy goes back to the question of the cause of sciatica and lumbago. Each author's explanation of his sign depends on the cult or theory which he accepts. There is a mass of confused literature on this subject. The cause of the confusion is that the writers start out with a preconceived notion as a premise, such as that the cause of sciatica lies in: the sciatic nerve, the sacro-iliac joint, the iliotibial band, the hamstring muscles, or the piriformis muscle. It is rare to find a writer on this subject who is not bound by these prejudices. The subject is still an open one for investigation based on the sound principles of scientific judgment. Regardless of theoretical explanations, these signs have value in demonstrating the presence of sciatica and associated conditions. While I do not wish to enter the lists in this controversy I believe that it is reasonable to say in a general way that the straight leg raising sign and its modifications concern the lumbar and posterior sacral attachments, while the extension abduction-rotation signs concern essentially the pelvic attachments of the hip.

In estimating the value of these signs in individual cases we must take into consideration such factors as the elasticity of the joints. Athletes are of two special types, exemplified in the panther type who is a pole vaulter, and the ox type who is a weight lifter. The one is elastic-muscled and limber-jointed, the other is raw-boned and muscle-bound. The extremes of these types are found in the contortionist and the overworked person illustrated by the painting, "The Man With a Hoe". As a result of these normal variations in flexibility the same degree of motion might be a positive sign in one and a negative sign in another.

Hip Flexion and Abduction with Knee Extension Signs:

Bonnett (1858) noted that forcible adduction of the flexed thigh increased the pain in sciatica. He also observed what is called "Bonnet's position", that is, flexion abduction and outward rotation which is assumed in coxitis. It is also present in sciatica when the region about the hip joint is involved.

Lasegue (1864) published his second sign to differentiate between sciatica and hip joint disease. It is also known as the "straight leg raising sign" or "ascension talonniere" of Sicard. In sciatica flexing the hip and knee at the same time is painless or easily accomplished, but flexing the hip with the knee extended or extending the knee when the hip is flexed causes pain. In hip joint disease flexing the hip is painful whether the knee is flexed or extended.

Kernig (1884) observed a sign similar to Lasegue's in acute meningitis. In the sitting position there is contracture of the hips, knee and sometimes the elbows. Also when the patient lies on his back and the thigh is flexed to a vertical position, complete extension of the knee joint is impossible. Kernig's sign is bilateral and disappears as the acute symptoms subside.

Lasegue's sign is unilateral and may persist for months and years. The pathogenesis of Kernig's sign had been the subject of much controversy and speculation which has never come to any definite conclusion. Plessi (1904) noted that Kernig's sign disappears on recovery when the spinal fluid becomes normal.

Schambouroff (1929) says, "the Lasegue sign is a symptom of pain connected with the sensory neuron, whereas the Kernig sign is a motor phenomenon connected with irritation or reflex heightening of excitation in the motor neuron."

Bechterew (1907) noted that in sciatica straight leg raising on the opposite side could cause pain on the affected side to a less degree. He thinks that this is due to the stretched nerve on the unaffected side, by its attachments in the cord, pulling on the nerve roots of the opposite side.

Deutsch (1921), with anatomical dissections, showed that in the signs of Bonnet, Lasegue, and Bechterew the sciatic nerve was put on the stretch and thus caused tension on the nerve roots.

He concludes that the pain comes from these nerve roots. He also confirms the findings of Bechterew.

Demianoff (1933) described a sign for lumbago. He finds that straight leg raising causes pain in sciatica or lumbago. He believes that this pain in sciatica is due to stretching of the nerve, and that the pain in lumbago is due to a lesion of the lumbar muscles. To demonstrate his sign he does the Lasegue test. If it is positive he repeats the test raising the leg with one hand, while holding the pelvis firmly to the table with the other hand. In sciatica the pain is still manifest, but in lumbago it disappears.

Hip Extension and Abduction Signs:

Patrick (1917): On the affected side, flex the hip and knee, abduct and externally rotate the thigh, place the ankle above the knee of the other leg. Except in advanced cases this can be done without pain. In this position depression of the knee causes pain in hip arthritis but not in "sciatica".

Gaenslen (1927) describes a maneuver of flexing one hip and extending the other at the same time. Then he reverses the procedure. He interprets it as differentiating between sacro-iliac and lumbo-sacral lesions and between right—and left-sided lesions. The patient lying supine flexes a knee and hip as far as possible and holds them there with clasped hands over the knee. The examiner reinforces this by pressing with one hand over the patients hands. The other leg at the edge of the table is allowed to hang and is pressed down further by the examiner's free hand, causing hyperextension of the hip. Pain will be observed on the affected side. This test is useful in detecting which side is affected and in detecting inconsistencies in the patient's complaints, but it is unsatisfactory for distinguishing between lumbo-sacral and hip or pelvic joint pains.

Prone Knee Flexion Signs:

Brunn (1912) has the patient lie prone. He flexes either leg at the knee joint. If the patient resists or complains, his lack of cooperation is manifest. This test is valuable, but it should be noted

that flexion of more than 90° may cause pain.

Ely, quoted by Pitkin (1936), finds that, with the patient prone, hyperflexion of the knee may cause elevation of the pelvis on the same side.

Nachlas (1936) describes extreme prone knee flexion as a test indicated by pain in the affected parts. This is practically the same as Ely's sign.

SPINAL FLEXION SIGNS:

Brudzinski: In meningitis, when the neck is bent forward flexion of the hip, knee, and ankle are produced.

Soto-Hall (1935): With the patient supine and the hand at the base of the skull flex the spine beginning at the neck and proceeding downward. There is usually pain at the site of a spinal lesion.

Lindner's sign, quoted from Schambouroff: "Flexing the head occurs as follows: If enforced passive flexion of the head to the chest is effected in a recumbent or sitting posture with outstretched leg, pain arises in the lumbar region, in the ischiatic area, and sometimes down the entire leg on the affected side. In acute cases this symptom is clearly manifested in a recumbent posture; in subacute cases it may fail to appear, but it will do so if the patient is made to sit up in bed with the legs outstretched." Schambouroff believes that Lindner's sign and Bechterew's sign are tokens of root sciatica.

PELVIC JOINT SIGNS:

Erichsen's sign: Compression of the iliac bones causes pain in sacro-iliac disease but not in coxalgia. It is practiced by squeezing the ilia together as the patient lies on his back, or by the examiner leaning his weight on one side of the pelvis while the patient lies on his side. Some authors say that this sign also distinguishes sacro-iliac strain from sciatica.

"Mobility signs" are used to bolster up the sacro-iliac idea. According to this idea hyperextension of the thigh causes the ilium to move away and forward from the sacrum. Also the same result is obtained from pressing the sacrum with one hand and gripping the ilium with the other. Decrease of the lumbar curve is said to denote bilaterally relaxed sacro-iliac articulations.

OTHER TESTS FOR SIGNS:

Turyn (1929) noted that with the patient on his back, dorsal bending of the big toe caused pain in the guteal muscle. This sign is unusual except in an acute condition.

Neri (1918) noted flexion of the knee on the affected side when the patient bends forward while standing or attempts to sit up while lying on his back.

Ober (1935): The patient lies on the unaffected side. The examiner places one hand on the pelvis to steady it and grasps the patient's ankle with the other hand, holding the knee flexed at a right angle. The thigh is abducted and extended in the coronal plane of the body. If contracture of the iliotibial band is present, the leg will remain abducted, even under anesthesia. This is questionable.

Gara (1911) describes an abdominal point of tenderness on the affected side. He presses the finger at a point below and lateral to the umbilicus and in the direction of the transverse process of the fifth lumbar vertebra. This test is not of much value because one cannot press through a large abdomen, and thin persons are normally tender in this spot.

Treatment

MEDICINE: The usual analgesics are quite effective in reducing the severity of the pain. If the patient is nervous or hysterical, bromides may also be used or soporifics may bring on much needed sleep. The most important and effective measure is to combat the toxicity of the bowel, which, if not the primary cause, is always an important adjunct. Epsom salts is most useful for this.

Potassium iodide came into use about a century ago. Many old writings testify to its great value in sciatica. It is best given on a full stomach, but if well diluted may be taken on an empty stomach.

Sodium salicylate and colchicum are useful. The following old prescription is still of value:

Sod. salicylati	VI drachms
Pot. iodidi	VI drachms
Pot. bicarbonatis	VI drachms
Ext. liq. colchici	II drachms
Aquae q. s. ad.	VI ounces
M. Sig.	Two teaspoonfuls t. i. d.; p. c.

A glance at the literature will show that the drugs and other methods of treatment are legion. This is as usual when there is no specific treatment. There are numerous records of marvelous cures. Among them the cautery takes front rank. One author naively mentions immediate cure of sciatica by application of the hot cautery to the sole of the foot.

Surgery

STRETCHING the sciatic nerve through an incision was first practiced by Billroth in 1869. Stretching of the nerve is also practiced without incision, along with stretching of the hamstring muscles while the patient is under general anesthesia. This method does not give any better results than the open incision, but like the "bloodless surgery" of the hip joint it appeals to the uninformed. Foot drop is not an unusual sequel. Frequently a swelling results between the ischium and the greater trochanter and is accompanied by increased symptoms.

Manipulations in the treatment of sciatica or "sacro-iliac strain" have been described by Baer, Cox, Fisher, Lewin, Magnuson, and Nutter. They amount to anesthetizing the patient and vigorously applying most of the various diagnostic tests. Anesthetization and hospital regimen with or without any major operation may produce as good results.

Injections of local anesthetics and other substances have been advocated by many on the supposition that sciatica is a disease of the nervous system. The improvement is seldom other than temporary, and it is not unusual that local paraly-

sis follows, with signs of neuritis which did not exist before the injection.

MECHANICAL DEVICES: Immobilization of the hip in a comfortable position is important in very severe cases. This means not only immobilization of the hip joint but also of all hip muscles with the lumbar and thigh muscles attached to the hip. This may be accomplished by the use of the plaster cast or the long splint used in hip fracture cases. Buck's extension is also used in hospitals. For home use the Hodgen's splint as used in the eighties by Dr. Charles C. Hunt gives very satisfactory results. This was essentially the same as the later popularized Weir Mitchell treatment with the long splint.

For ambulant patients the sacro-iliac belt has become popularized. I believe that strapping the hip muscles gives comfort in the same manner as strapping the calf muscles relieves the pain of a sprained ankle.

Heat applications are very useful.

Sunlight obtained by lying on a hot sandy beach is of great benefit. A good coat of tan works wonders. Diathermy appears to have some value.

Artifically induced fever is gaining favor in the treatment of arthritic conditions. Enthusiastic claims are made for it in sciatica cases.

Hygiene and Prophylaxis

FOOD is important because cases are aggravated, if not caused, by allergic conditions.

Clothing should not only protect against cold and wet but also against penetration of wind. Henry Hunt (London, 1844) says: "Wear flannel drawers—and washed-leather drawers over the flannel during the winter months." This is good advice, especially in a climate where chilblains are prevalent.

SHELTER: Living quarters should be free from draft and kept moderately warm, about 72°. The air should be free from escaping illuminating gas and the exhausts of automobiles. A springy resilient mattress is better than one in which the patient sags deeply. The chair with a thin leather cushion is better than stuffed upholstery. The patient prefers to sit on his ischial tuberosities rather than to have the cushions press in about the soft parts.

CLIMATOLOGY: The sciatic patient, like one with arthritis or corns, makes a good weather prophet. Symptoms are always worse before a storm. Cold winds and rain are bad. Warm weather wet or dry, so long as it is free from wind, makes the ideal climate. The far north with its cold snappy dry weather is not as bad as the northern seacoast regions with their chilly wet winds.

PROPHYLAXIS: In addition to adopting the hygienic measures above, the patient should modify his work and play so as to keep the exercise of his body within the limits of his capacity. Any exercise is interdicted which may put strain on the affected structures. Heavy lifting, high climbing, long walking, or even sitting for a long time in a strained posture may cause a recurrence. These conditions often make a change of occupation necessary. For exercise gentle strolling is quite sufficient. An appropriate Turkish proverb says: "Never stand up when you can sit down. Never sit down when you can lie down."

PATHOLOGY: Sciatica has no known specific pathology. Articles are written on the pathology of sciatica, but they concern sciatic neuritis which is only exceptionally present in sciatica and when present is a secondary feature. In the condition called idiopathic sciatica Inman finds such pathology as exists to be in the muscles, fascia and tendons, but not in the nerve. When the pathology is properly worked up it will probably be found to be like that of painful shoulder which is usually a bursitis associated with torn or degenerated tendons, ligaments, and periosteum.

Industrial Health Council

—*First Meeting*—

THE new Council on Industrial Health held its first meeting, at the headquarters of the American Medical Association in Chicago, December 10.* In addition to the nine members of the Council there were present Drs. Austin A. Hayden, Secretary of the Board of Trustees, R. L. Sensenich, member of the Board of Trustees, Olin West, Secretary and General Manager, Morris Fishbein, Editor, W. C. Woodward, director of the Bureau of Legal Medicine and Legislation and P. A. Teschner of the Department of Health and Public Instruction. The meeting was devoted to consideration of organization of the Council.

The morning session was opened by a statement by Dr. West, in which were reviewed the official acts of the House of Delegates and of the Board of Trustees that led to the organization of the Council on Industrial Health. At the annual meeting of the Association in Kansas City, a resolution was introduced into the House of Delegates calling attention to the increase in recognition of the seriousness of diseases arising from conditions to which workers are exposed from certain occupations, and requesting that the Board of Trustees enlarge its study of industrial and occupational diseases. The resolution was referred to a reference committee on hygiene and public health, which in its report to the House of Delegates recommended that the American Medical Association establish a council which shall concern itself with matters pertaining to the control and prevention of occupational disease. The report of the reference committee was adopted by the House of Delegates and a few months ago a group of men particularly qualified in industrial medicine and public health were invited to confer with the Executive Committee and the Board of Trustees in an all-day conference, at which the general subject of industrial health, especially with reference to the desirability of the appoint-

* *J.A.M.A.*, Organization Section, January 29, 1938.

ment of a council, was gone over carefully. That group of men also recommended that the Council be organized and later the Board of Trustees selected nine men to serve as the first members of the Council.

At the opening session of the first meeting of the Council, the members reviewed briefly their experience in industrial work, which for the most part extended over a period of many years. These brief addresses primarily were for the purpose of acquainting members of the Council with one another and to give the Council information on the problems for which its members were especially qualified for intense study. Much time was devoted to a general consideration of some of the problems which the Council will have to meet.

It was pointed out that the problems in industrial medicine are essentially medical in their nature and that the doctor is the central figure, although at times they may be definitely of a medico-social or social nature. In endeavoring to define industrial medicine, its scope was shown to be extremely wide. An important problem discussed was the education of physicians in this field and improvement of the general standards. Other problems mentioned were the reporting of occupational disease in various states, and the medical regulation of industrial commissions and departments of health for various industries. The relation of the industrial physician to private physicians and of the industrial physician to independent industry and to compensation tribunals, state authorities and as consultants in drafting industrial compensation laws was mentioned. It was realized that many organizations are already interested in industrial medicine and that the organizations which they represent include not only the government but industry, labor and private and semi-private organizations.

Other problems briefly discussed included the regulation of agents or technics and of solvents and toxic substances used in industry, the problem of the free choice of physician and that of pay roll deductions for medical care, and the extension of work in this field through the release of social security funds.

It was suggested that the Council should proceed slowly at first in its work and avoid any frustration of effort in attempting to do too much in a short time. The Council might act as a clearing house for information on industrial health.

Another member pointed out that under the present arrangement the financial aspect of the need in industry brought about through the increase in occupational disease hazards and the compensation laws is growing and has become such a burden that it will swamp industry if the medical profession does not come to its assistance.

The profession generally has little knowledge at present of the enormous scope of the work with which the Council will have to deal. It must contribute to the efficiency of medical service to industry and strive to reduce the loss of life and the economic loss that results from industrial processes. Attention must be given to some limitation of the activities of the medical set-ups in industry lest they rapidly move in the future toward the corporate practice of medicine. Abuses have grown up which the Council will have to consider, one being the widespread existence of so-called contract practice, and the denial of the right of the employed person to choose his physician. As the discussions by the different members progressed, they pointed to the need of further education of the profession and to the dearth at present of teaching facilities in medical schools.

The meeting was informed and all members were encouraged to express their views on the probable scope of the problems they would have to consider. It was suggested that the activities of the Council might be divided into several definite groups with subdivisions under each group. A study of the legal aspects of industrial medicine, including a correlation and digest of existing compensation laws, was mentioned as probably necessary before the Council could recommend some more or less standardized laws. Likewise the Council would need to collect and analyze all the available data on disease as it applies to industry; this particular problem has not been fully covered in the literature and there is need for either a textbook or a series of monographs, published by or under the sponsorship of this Council, to cover the field of industrial health from a scientific standpoint. There is the question of pre-employment examinations and periodic examinations in industry and who shall make them. It is also important for the Council to learn who are the qualified physicians who can act as consultants to industry. The Council can be of service to various industries in showing them that they will be best served by setting up their own medical service.

Drs. Fishbein and West, of the Association headquarters, described in a general way the plan of organization of the various councils of the Association which have been in existence for many years. The methods whereby these Councils conduct their work were outlined. All of them have their offices in the headquarters building and carry on their work partly through a system of bulletins which are sent out to each member of the council. This brought up the question of the election of a permanent secretary for the Council on Industrial Health.

The discussion clarified for the new members the relation of the Council to the House of Delegates and the Board of Trustees and to the other official bodies through which the Association conducts its ever widening activities. The Council considered the appointment of committees that would be charged with the duty of reporting on those subjects which the Council thinks should be taken up first. Three committees were agreed on for the immediate organization: a committee on scope and general statement, another on rules and procedure, and another on nomenclature. It was agreed that the chairman of this meeting,

Dr. Stanley J. Seeger, of Milwaukee, should appoint the committees.

The Council then proceeded to prepare a brief statement of the organization of the Council for immediate release to the press. The Council discussed the preparation within a few months of one or more scientific papers for publication in *The Journal* on some scientific phase of industrial health. It was voted to have Dr. Earl D. Osborne, of Buffalo, a member of the Council, direct the preparation of a paper dealing with present-day knowledge of syphilis in industry, and Dr. Leroy U. Gardner, of Saranac Lake, N. Y., a member of the Council, direct preparation of a paper of a similar scope on silicosis.

It was pointed out that the other councils and bureaus with offices in the headquarters building had an immense amount of data and information of many kinds, some of which undoubtedly would be of help to the Council on Industrial Health in its work and that this material was available. It was agreed to have another meeting of the Council as soon as certain arrangements could be made, and the time was tentatively set as in February, the definite date to be decided later.

THE members of the Council on Industrial Health are:

Dr. Stanley J. Seeger, Milwaukee, Chairman;
Dr. Harvey Bartle, Philadelphia;
Dr. Warren F. Draper, Washington, D. C.;
Dr. Leroy U. Gardner, Saranac Lake, N. Y.;
Dr. Morton R. Gibbons, San Francisco;
Dr. H. H. Kessler, Newark, N. J.;
Dr. A. D. Lazenby, Baltimore;
Dr. Earl D. Osborne, Buffalo, and
Dr. C. W. Roberts, Atlanta, Georgia.

Industrial Medical Meetings

—1938—

MAY:

Association of Surgeons of the Southern Railway, New Orleans, Lousiana, May 2, 3, and 4, 1938. *Treasurer,* Edith A. Foltz, Railway Building, Washington, D. C.

Texas Railway Surgeons Association, Galveston, Texas, May 9, 1938. *Secretary,* Dr. Ross Trigg, First National Bank Building, Fort Worth, Texas.

Central States Society of Industrial Medicine and Surgery, Nineteenth Annual Meeting, Springfield, Illinois, May 17, 1938. *Secretary-Treasurer,* Dr. Frank P. Hammond, 6308 Cottage Grove Avenue, Chicago.

JUNE:

American Association of Industrial Physicians and Surgeons, Twenty-Third Annual Meeting, in conjunction with the Midwest Conference on Occupational Diseases, Palmer House, Chicago, Illinois, June 6, 7, 8, and 9, 1938. *Secretary-Treasurer,* Dr. Volney S. Cheney, Armour and Company, Union Stock Yards, Chicago, Illinois.

Institute of Traumatic Surgery, June, 1938. *Secretary-Treasurer,* Dr. John D. Ellis, 122 South Michigan Avenue, Chicago.

SEPTEMBER:

American Association of Railway Surgeons, Forty-Ninth Annual Meeting, September 19, 20, 21, Palmer House, Chicago. *Secretary,* Dr. D. B. Moss, 547 West Jackson Boulevard, Chicago.

Association of Surgeons of the New York Central System, Fifteenth Annual Meeting, September, 1938. *Secretary-Treasurer,* H. A. Fathauer, 413 LaSalle Street Station, Chicago.

NOVEMBER:

Section on Railway Surgery, Southern Medical Association, Oklahoma City, Oklahoma, November 15, 16, 17, and 18, 1938. *Secretary,* Dr. James W. Davis, Davis Hospital, Statesville, North Carolina.

New York State Society of Industrial Medicine, Eighteenth Annual Meeting, Albany, N. Y., November, 1938. *Executive Secretary,* Frank E. Redmond, 361 Delaware Avenue, Buffalo, N. Y.

A.A.I.P. & S. Program

UNDER the direction of Dr. Edward C. Holmblad, Chairman of the Program Committee, the program for the Twenty-Third Annual Meeting of the American Association of Industrial Physicians and Surgeons and the Second Midwest Conference on Occupational Diseases, June 6, 7, 8, and 9, 1938, is rapidly taking shape.

On Monday, June 6, the principal subject will be "Industrial Hygiene," under the following subdivisions:

1. Development of New Apparatus for Industrial Hygiene Study.
2. Significance of State Industrial Hygiene Bureaus.
3. Newer Applications of Industrial Hygiene Surveys.
4. Relationship of Insurance Companies to Industrial Hygiene.
5. The Engineer's Place in Industrial Hygiene.
6. The Doctor's Responsibility in Industrial Hygiene.

On Tuesday, June 7, the principal subjects under "Occupational Diseases," will be:

Tuberculosis in Industry;
Women in Industry;
Noise, Illumination, and Fatigue; and
Occupational Dermatoses.

On Wednesday, June 8, the subjects will include:

Problems of Industrial Medicine and Surgery;
Medical Departments and Compensation;
Syphilis in Industry; and
Night Blindness in Truck Drivers.

On Thursday, June 9, under the general head of "Medicine and Surgery," there will be a study of the Treatment of Injuries in Industry.

And on Friday, June 10, the special train organized and conducted by the Illinois Medical Society will depart for the Annual Convention of the American Medical Association at San Fran-

cisco, California, the following week, June 13-17.

Among the collaborating organizations are the following:

State of Illinois, Division of Industrial Hygiene;

Dept. of Public Health and Hygiene, University of Illinois College of Medicine;

Chicago Society of Industrial Medicine and Surgery;

Institute of Traumatic Surgery;

Board of Health, City of Chicago;

Occupational Disease Research Department, Northwestern University Medical School.

Chicago's "Home of Hospitality," the Palmer House, will be headquarters. And Scientific and Technical Exhibits will be among the most interesting features of the occasion.

THE AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS was organized at Detroit, Michigan, in 1916.

That fact owes much to DR. ANDREW M. HARVEY, who, "in 1914 urged the organization of an association of industrial physicians and surgeons; called together in 1916, the group which organized the A. A. I. P. & S.; was Chairman of the Organization Committee and the Organization Meeting, and for numerous terms a member of the Board of Directors."*

Chicago Society

CHICAGO SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY will hold its Mid-Winter meeting, on February 14, 1938, at 8:30 P.M., at the meeting place on the twenty-third floor of the Medical and Dental Arts Building, 185 North Wabash Avenue, Chicago.

The program, under the direction of DR. CHARLES DRUECK, JR., will include the following presentations of the general subject of Workmen's Compensation Acts:

1. "Factors Determining Compensation from the Medical Viewpoint"—EDWARD C. HOLMBLAD, M.D., F.A.C.S., Regional Chief Surgeon, Railway Express Agency, and Consultant, Insurance Companies.

2. "Compensability of Injuries from a Legal Standpoint"—HENRY H. ROLFE, Past President, Casualty Adjusters Association of Chicago.

Central States Society

CENTRAL STATES SOCIETY OF INDUSTRIAL MEDICINE will hold its nineteenth Annual Meeting at Springfield, Illinois, May 17.

The program will provide for two sessions:

The morning session will be devoted to occupational diseases, industrial solvents, the early recognition of tuberculosis in industry, medicolegal aspects of occupational diseases, and industrial dermatoses.

The afternoon session will be a joint meeting with the Surgical Section of the Illinois State Medical Society, covering subjects connected with abdominal injuries.

* WHO'S WHO IN INDUSTRIAL MEDICINE AND TRAUMATIC SURGERY.

Section on Railway Surgery

THE SECTION ON RAILWAY SURGERY, of the Southern Medical Association will hold its Annual Meeting in Oklahoma City, Oklahoma, November 15-18, 1938. DR. GEORGE A. TRAYLOR, of Augusta Georgia, is Chairman of the Section; DR. OLIVER B. ZEINERT, of St. Louis, Missouri, is Vice-Chairman; and DR. JAMES W. DAVIS, of Statesville, North Carolina, is Secretary. The program of this meeting will be published in an early issue of INDUSTRIAL MEDICINE.

The profession is invited.

Chronic Actinic Dermatitis

—An Occupational Hazard of the Southwest—

DERMATOLOGISTS and radiologists of this section see abundant proof that over-exposure to the sun is harmful to the skin and hastens the process of aging and the physical signs which accompany it.* The individual who tans readily and uniformly, will often withstand for a long time this continual repetition of insults to the skin. The red-haired and freckle-faced individual, particularly in the presence of seborrhea, under the same conditions will comparatively early in life develop this group of changes which may be called chronic actinic dermatitis. It is fairly common to see this type of skin develop advanced changes in the early thirties, and occasionally they occur much earlier. I recall a blond cowboy of 20, with keratoses on the exposed parts, and a large cutaneous horn on the lip, covering a squamous cell epithelioma. Recently, I have seen a red-haired freckled farm girl of 16, with keratoses on the backs of both hands. Her father has the same type of skin, and has been treated at intervals for years, for keratoses, and an occasional epithelioma. Farmers and ranchmen of the Southwest often return regularly to the dermatologist or radiologist for the treatment of keratoses and epitheliomas which continually appear. It is not uncommon to find on their first visit 10 or 20 keratoses on the exposed parts, in several of which epitheliomatous changes have developed.

Chronic actinic dermatitis is essentially an acceleration of the normal process of aging of the skin due to the ultraviolet rays of the sun acting upon a susceptible skin. The changes are quite similar to those seen in chronic radiodermatitis, though less marked and slower of development, and are identical with those of the true senile skin. All three conditions are characterized clinically by freckling, pigmentation, depigmentations, atrophy, telangiectasia, keratoses, and epithelioma.

The most prominent feature of chronic actinic dermatitis is the development of keratoses, and subsequent epitheliomas. Clinically and histologi-

* From a paper by LESLIE M. SMITH, M.D., El Paso, Texas; read before the Section on Radiology and Physiotherapy, State Medical Association of Texas, Fort Worth, May 12, 1937; published in *Southwestern Medicine*, January, 1938.

cally these are of a type identical with those of radiodermatitis, and the senile skin. Briefly the keratoses show on microscopic examination: hyperkeratosis, parakeratosis, thickening of the malpighian layer with a tendency to accentuation of the granular stratum, slight edema of the epidermis, and in the cutis basophilic degeneration of the connective tissue and some degree of round cell infiltration.

The epitheliomas are almost always of the squamous cell variety. I have occasionally seen both squamous and basal cell growths in these patients, though I have no proof that basal cell epithelioma ever develops from this type of keratosis.

Young individuals with reddish hair and a tendency to freckling should be discouraged from entering an occupation which takes them into the open too much. Farmers and ranchmen cannot often be persuaded to change their vocations, and such patients should be strongly advised to wear gloves and large hats, and to make frequent use of creams and other local applications which lessen the effects of the sunshine on the skin. Goodman gives a number of formulas for such preparations, though the protection afforded by any non-irritating oil or cream is considerable.

After advanced changes have appeared in the skin no treatment will cause it to become normal again. The prophylactic measures mentioned above will, however, still be of value in arresting the progress of these changes.

Unsightly telangiectases, if they are not too extensive, can be obliterated by electrolysis.

Early superficial keratoses can be destroyed by curettage and the application of trichloracetic acid or other caustic, but after the base has become thickened electrodessication is much to be preferred.

As to the treatment of the more advanced keratoses and the epitheliomas, there are several methods which are satisfactory in selected cases. While x-rays and radium will usually destroy these lesions, electrodessication or electrocoagulation is preferable in the average case. Since the changes already in the skin are similar to those of radiodermatitis, it would seem desirable to avoid too much radiation in this condition. However, in certain cases, particularly in large lesions of the face, where the cosmetic result is important, radiation may be preferable, provided that the immediate region has not previously been irradiated. Lesions may appear on the sites of previously irradiated ones, and after repeated irradiation the area becomes so atrophied that it heals poorly after any destructive method. Such skin is certainly not suitable for further radiation treatment.

SUMMARY: The group of changes which occur in the skin following long continued exposure to sunshine is described under the name of chronic actinic dermatitis. The changes are similar to those in radiodermatitis, differing principally in degree. A certain type of skin and certain occupations are particularly susceptible. The abundant sunshine of the Southwest makes the condition especially common in this region. A brief outline of preventive measures and treatment is given.

Northwestern Symposium

NORTHWESTERN UNIVERSITY MEDICAL SCHOOL, Chicago, anounces that the papers presented at the Occupational Disease Symposium held in September, 1937, in Chicago, together with the discussion, have been assembled in a brochure and are now available for distribution. The publication includes the papers presented by DRS. FEINBERG and SULZBERGER on "Industrial Allergy and Dermatoses", DRS. PENDERGRASS and GARDNER on "Silicosis", DR. ALICE HAMILTON and MR. COOK on "Industrial Solvents", DR. KEHOE on "Lead Poisoning", DR. MORRIS FISHBEIN on "The Future of Industrial Medicine", and MR. B. C. HEACOCK on "The Prevention of Occupational Diseases".

This brochure is available to physicians and industrial executives interested in occupational diseases. The cost is $1.50.

Third Symposium on Silicosis

THE official transcript of the Third Silicosis Symposium, held in connection with the Trudeau School of Tuberculosis at Saranac Lake, N. Y., June 21 to 25, 1937, is now published in book form. The material was edited by B. E. KUECHLE, Vice-President and Claims Manager, Employers Mutual Liability Insurance Co., Wausau, Wisconsin. The list of contents is as follows:

"The Significance of the Silicotic Problem," DR. L. U. GARDNER.

"Etiology of Silicosis, DR. R. R. SAYERS. (Discussion.)

"Dust Concentrations and Their Measurement, PROF. PHILIP DRINKER. (Discussion led by T. M. DURKAN.)

"Pathology of the Pneumoconioses," DR. L. U. GARDNER.

"Pathology of the Pneumoconioses: Correlation of Pathologic and Roentgenologic Findings," DR. L. U. GARDNER. (Discussion.)

"Roentgenologic Aspects of the Normal and Silicotic Lung," DR. E. P. PENDERGRASS. (Discussion.)

"Roentgenologic Diagnosis of Silicosis," DR. H. L. SAMPSON.

"The Clinical Picture and Diagnosis of Silicosis with Consideration of Disability," DR. A. R. RIDDELL. (Discussion.)

"Control—Medical Aspects," DR. A. R. RIDDELL. (Discussion.)

"Administrative Aspects of Silicosis," D. E. CUMMINGS. (Discussion.)

"Legislative Control and Compensation," T. C. WATERS. (Discussion.)

A review of this volume, by C. O. SAPPINGTON, D.M., DR.P.H., will appear in our March issue.

Industrial Medicine

Reg. U. S. Pat. Off.

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Pre-Hiring Rehabilitation

THE perspective of the future may be relied upon to describe this era in the terms of its permanent deserving. Meanwhile it seems within the memory of men now living that nothing since the Credit Mobilier—not "free silver," "he kept us out of war," not even Prohibition—has palsied speech, crippled vocabularies, and exhausted invective as has that phenomenon of the times which is known as the "new deal." Historians to come may remark upon this phenomenon as nothing more than the ill-advised forcing of a rate of normal change, a stumbling of clumsy feet upon the threshold of an inevitable social development—while they laugh at its name as the wise-cracking shibboleth of a political opportunist with a Messiah complex. Or they may give the period no more significance in their lengthened panorama than that of a lull between two wars, the last one and the next. But if everything else which seems important now shall sift into forgetfulness through the meshes of the long view, this much must still remain as identified with the period of the "new deal": that it was the period in which the spotlight of attention moved over from the material to the human, turned away from things and on to people. Regardless of whether this was "in the cards" or not, it is a *fait accompli* of the era, forever associated with its years.

ONE has only to consider the remarkable work being done in rehabilitation to be sure of this. Rehabilitation is comparatively new, but it has gone a great way. Its initial impetus was an aftermath of the war. The exigencies of workmen's compensation carried it over into industry, in application to the injured employee. And public and private agencies are carrying it still further, to the blind, and the deaf, and even the permanently disabled. Already it has its specialists, its laboratories, its journal, and its own expanding literature.

It will be said, of course—indeed it *has* been said, and from within the medical profession—that the interest of industrial employers in rehabilitation is purely selfish. The common sense that views it as economical is met with the criticism that its basis is nonetheless financial. In pride of achievement—in minimizing the costs of workmen's compensation insurance—an insurance company advertises: "Another specialized service gives a second opportunity to profit—doctors, experienced in refitting injured men for their jobs, often save valued skill that might otherwise be lost forever." But the critics reply: "They wouldn't do it if there wasn't money in it."

Certainly there's money in it. And certainly it is done by employers *because* there's money in it. This however, is a matter of good fortune for all concerned—good fortune for the whole economic structure in that employers, who *must* make money in order to continue to be employers, are as smart as they are in doing it; good fortune for the employee who has it done for him; good fortune to everyone involved, in that the more it is done the more profit there is in it for the doer as well as for the ones in whose behalf it is done. The profit motive, therefore, is its own justification, when the work and its results are such as they are in rehabilitation.

INTERESTINGLY enough, however, it remains for much-criticized industry to have gone farther than any other agency in this respect. For industry—where "charity has no business to sit at boards of directors *qua* charity," and where, therefore, there can be neither expectation of charity nor criticism for the lack of it—has, nevertheless, begun the rehabilitation of the *prospective* employee. There is an instance in the words of DR. HAROLD A. VONACHEN,* Medical Director of Caterpillar Tractor Company, Peoria, Illinois:

"When an individual presents himself for employment, a pre-employment examination is made, and a routine Kahn test is taken and submitted to our own laboratory. If the report of the Kahn test is positive, the individual is so informed and requested to report to his family physician for a re-check, and if this coincides with the previous

*See "Method of Syphilis Control in Industry," on page 41 of INDUSTRIAL MEDICINE for January, 1938.

blood test, the individual is hired with the definite understanding that he must submit himself to his family physician, or to a venereal clinic, for treatment, and continue treatment until such time as an agreement can be reached between the medical department and the attending physician that sufficient medication has been given. This case is then diaried for a six-months period, at which time, the family physician is consulted and asked for information as to the amount of treatment given to the individual. If it is then found that the individual has failed to avail himself of the opportunity to improve his physical condition, he is dismissed from the service of the company. If the individual has been receiving treatment, he is then diaried for another six months, after which time a further inquiry is made as to his condition and number of treatments."

DR. VONACHEN is out in front in this, so far as syphilis is concerned. But the idea is already being applied in other respects by employers whose working forces aggregate about 2% of the "industrially" employed.

Let those who sneer "commercial" at everything done by industrial employers fuss with *that* a while.

Tension in the Teens

IT IS the history of most ideas big enough to affect the lives of the multitude that they found spontaneous and almost concurrent expression in a few minds, tuned to their coming, long before they were ready for general acceptance. The litigation of certain patents—the incandescent light, for example—is material proof. Conversely, therefore, when an idea which looms up as really big begins to be talked about here and there, the history may be going to repeat.

The idea of fatigue and its effects—as a factor in accident causation, physiological reactions, and even susceptibility to various mental as well as physical influences—is certainly big. And it is certainly beginning to be talked about. DR. J. R. GARNER, of Atlanta, Georgia, has been investigating it for some time (see his discussion of "Fatigue" in INDUSTRIAL MEDICINE for December, 1937); DR. ALICE HAMILTON is eloquent upon its effects (see her comments as republished, also in our December, 1937, issue); ELTON MAYO and LAWRENCE HENDERSON, at Harvard, are exploring the part played by psychology in the fatigue of employees in modern, mechanized industry; and elsewhere, in many minds, the accident-proneness of the *tired* worker, evident when, and because, he is tired, is the subject of growing interest and more intensive concentration.

And now, impressed by the physical signs of tension in the men with whom he is in medical contact, DR. NAT. P. BROOKS looks ahead to the time when those men will be replaced by their successors from among the young adults now being prepared in various ways for their places in the world of work. He sees these young people under a tension of their own, already so great as to make it inevitable that they will have to go through the mill of painstaking selection before they can be given the responsible jobs wherein the tenure increases the tension. He cites the pressure, and the resulting fatigue, of over-long school hours as the main cause of the increasing nervous instability in early adult life. And in so doing he puts a practical argument into the hands of thousands of thoughtful parents who are beginning to be conscious of something wrong, but have been unable to give it an effective expression.

THE adolescents of these times have much to absorb and much to resist. The fast pace of work and travel which is the tempo of adult life has its counterpart in the speed of sports and amusements in the teens. Radios bombard, movies absorb, autos attract, games engage, and the intensiveness of closely-knit social contacts bears down—until the growing child is not only tired in body but also exhausted as to emotional response.

These things, together with "too much home work" as a part of school duties, are the subjects of occasional letters to the newspapers. And a few educators are beginning to be sensible of their effects. But maybe these, in a manner of speaking, are "growing pains" of a social adjustment. DR. BROOKS', however, may have named the place of the first remedial measures: it won't be nearly as feasible to ease off the other pressures as it will be to reduce that of the school hours.

At any rate, we believe that a movement big and important is in the making with respect to the study of fatigue. May it be ready soon!

Meanwhile, "there's always something." DR. TICE, in his discussion of DR. HRUBY'S paper (see page 67) says that "within a very few generations we will have a race devoid of immunity to tuberculosis" because, through control of the disease, there will no longer be any occasion for the immunity. But that gain—as well as others, in the control of other diseases—still may be uncomfortably offset by the need to build up another immunity—to the machine-gun battering of the life we live upon the sensibilities we possess, with the nerve specialists and the psychiatrists moving in as the medical and surgical men move out.

Industrial Health

FROM the account of the first meeting of the AMA Council on Industrial Health (see page 90) three things are of present interest.

The *first* is the reference to a definition of industrial medicine.

No better definition is needed than this:

"Industrial medicine is the practice of medicine superimposed upon the employment relation."

Unless the employment relation exists, the medicine is just general medicine in whatever of its applications the individual patient may

require. Wherever the employment relation exists it becomes quite something else—because, in first importance, the patient is an employee and has an employer, and, secondly because the employer in one way or another is going to pay the bill.

The *second* is the realization "that many organizations are already interested in industrial medicine."

Industry—the employer—is among these.

But more, the employer individualiy, and all employers collectively, *are more vitally interested than anyone else*—essentially because of the fact that they *are* the employers and *do* pay the bills.

The *third* is the reference to "some limitation of the activities of the medical set-ups in industry lest they rapidly move in the future toward the corporate practice of medicine."

It can be safely said that medical set-ups in industry are not going any further medically than they have to; they are not going to extend the range of their activities beyond the necessities of *industrial* medicine. This is obvious, for the very good reason that everything they do costs money —and money which they don't have unless they earn it.

If however they do go farther than some believe they should, it will not be because they want to but rather because they have to. And, from present indications, if it becomes necessary for them to go further than they should, they probably won't do it, but instead will be in position to put, and will put, the blame exactly where it belongs.

AT THIS writing it is not clear that the blame is entirely separated from the attitude and the activities of parts, at least, of the medical profession. The trend seems to be as apparent in occupational diseases as it is in politics, to place everything on industry's doorstep. Thus the editorial sentence (see page 107): "as to the problem of adequate medical care, more than half of it is an economic problem that industry, agriculture, etc., must solve . . ." And there is also the comment by DR. R. R. SAYERS*, which we mentioned editorially in our January number, with reference to syphilis: "That there is a responsibility upon the industrial medical officer to see that adequate modern treatment is available to employees at prices ordinary wage-earners can afford—*that if such is not otherwise available, the industrial medical service should itself undertake such treatment.*" (Italics ours.)

The traditional criticism of industrial medicine has been that it is curative rather than preventive. This, however, has been out of date for some time. And preventive medicine in industry is growing so fast and is being so well handled, on the whole, that there is nothing in present practices to cause the lack of prevention on the one side and the fear of engaging in corporate practice of medicine on the other to be set up as the Scylla and Charybdis between which it is necessary for any company having a medical service to steer such a careful course.

The growth of industrial medical practice from its origin in the traumatic surgery of compensation to its increasing manifestations in preventive measures for employees has been a natural evolution. There aren't any ogres lurking in the shadows of its forward movement, so long as it is willing, as it most emphatically is, to conform to the Minimum Standard of the American College of Surgeons, and have the A.C.S. Certificate of Approval displayed in the office of the medical department, as it now appears in "nearly a thousand." The Minimum Standard, maintained as it must be to keep the Approval, is pretty good evidence of a safe course in this respect.

* See "Syphilis and the Worker," on page 1 of INDUSTRIAL MEDICINE for January, 1938.

We Add an Editor

DR. M. N. NEWQUIST, probably as widely known, and certainly as favorably known, among industrial physicians and executives throughout the United States as any man in the industrial medical field, has joined our editorial group and is now one of the Editors of INDUSTRIAL MEDICINE. How much he brings, in added breadth and depth, to the reservoir of our editorial resourcefulness, is evident in even the clipped staccato of WHO'S WHO: *

NEWQUIST, MELVIN NATHANIEL, M.D.; b. Wausau, Nebr., July 6, 1897; A.B., Univ. of Nebraska, 1921; B.Sc., Univ. of Nebraska Coll. of Med., 1922; M.D., Univ. of Nebraska Coll. of Med., 1924; intern., Univ. of Nebraska Hosp., Omaha, 1924-25. Army: 1st Lieut., U. S. Med. Res. Corps., 1924-34. M., Grace E. Wolfe, Sept. 9, 1925. General practice, Bloomfield, Nebr., 1925-29. Identified with American College of Surgeons, as Field Representative, Dept. of Industrial Medicine and Traumatic Surgery, f.t., since 1931; engaged principally in making the A.C.S. firsthand surveys of medical services in industry, of which nearly 1,400 have been made, resulting in the approval of more than 700 industrial medical services on the basis of the American College of Surgeons Minimum Standard for Medical Service in Industry. Fellow, A.M.A.; member: Illinois State Med. Soc.; Chicago Med. Soc. Author: "Medical Service in Industry and Workmen's Compensation Laws," *Am. Coll. Surgs.*, 1934; "From the Department of Industrial Medicine and Surgery of the American College of Surgeons," *Surg., Gynec. & Obst.*, 1934, '35, '36, '37. Lutheran; Democrat; Nu Sigma Nu; Phi Beta Kappa, Alpha Omega Alpha. Office, 40 East Erie Street, Chicago.

Since the foregoing was published, both DR. NEWQUIST and his associate in the field work of the Department of Industrial Medicine and Surgery, DR. E. W. WILLIAMSON, have been made officers of the College, with the title of Assistant Director; and the number of industrial establishments surveyed has grown to nearly 1,700, while the number of medical departments fully or provisionally approved has increased to 850, representing 5,500,000 employees.

THE AMERICAN COLLEGE OF SURGEONS has been interested in industrial medicine a long time. This interest had a natural beginning in trauma, which presented the sequence of (1) industrial injury followed by (2) surgical repair, and a

* WHO'S WHO IN INDUSTRIAL MEDICINE AND TRAUMATIC SURGERY.

natural development in the logic which saw, in the abundance of the need for cure, the inevitability of the need for prevention. Cure meant care, and care for the injured needed only a little more to become care for the ill—while, from that attainment, the next and final step would be elimination or control of the hazard responsible for the injury or the illness.

The surgical mind is trained to orderliness, and to organization. And — more significant — it is trained to action. In 1926, therefore, a Committee on Industrial Medicine and Traumatic Surgery, consisting of representatives of the College, of medical departments of insurance carriers, and of industrial organizations, was appointed to study and evaluate the need, and the possibilities, of organization in industrial medical work in all its phases—preventive and administrative, as well as curative—and, if possible, suggest improvements.

The history of that Committee and its 12 years of service is impressive in numerous respects, and particularly so in two. The first is the satisfying simplicity of its methods; the second is the unerring accuracy of its results.

The initial step was personal surveys of medical services and departments in industry at selected points in the United States. "These early surveys revealed: that injured workers generally had not been cared for by those better qualified in surgery; that many of the physicians or surgeons serving industry served as medical employees on a curative basis only; that many physicians had not been delegated the appropriate authority by the employer to supervise the medical service, or that the physicians were disinterested in the administrative and preventive phases of industrial medicine; that many indicated preventive health measures had not been instituted; and that most of the smaller industrial establishments lacked adequate service."

From the findings of these direct investigations, together with the experiences of the members of the Committee, this group formulated a Minimum Standard for Medical Service in Industry,* applicable to all industrial organizations regardless of size.

This was then offered to industry; acceptance and subsequent maintenance were to be entirely voluntary.

The response from the medical directors of important companies was such that the College began the practical application of its Standard in 1931. Personal surveys of industrial medical services on a nation-wide basis were undertaken, and two years later the College published its first list of several hundred approved medical services. As before noted, this number has grown considerably since then.

ALL THIS is history, a proud chapter in the bright book of a great medical organization, with now almost a thousand "Certificates" of pride —in themselves, and their standards, and their opportunities—on the walls of almost a thousand cooperating industrial medical departments. It is history, in that it has been done, and is continuing to be done, and in every relation has been and is *constructive*. But it is a quiet history; no fanfare watched it forth, no parades have marked its progress. Unadvertised, almost unnoticed, it has marched alone, until, of a sudden, here is the leader and there is the legion.

It was done, and the doing of it takes its place among the major achievements of the American College of Surgeons. The vision that saw it, the enterprise that made it real, the technique of its multiplication, and the unobstrusiveness with which its merit was let alone to elicit its own praise, are all in keeping with the background, and the traditions, and the motivation, of the College. And the expression of these things in this work is, in its own way, a tribute to the inspirational genius of DR. FRANKLIN MARTIN, who—in industrial medicine, as well as in other directions—was constantly watching the sun where so many saw only the shadows.

If it could have been more generally known and talked about, especially within the past few years, the criticisms might not have been so prevalent in high places that industrial medicine was too curative, not enough preventive. The criticisms, however, seem to have died "in their own too much"; they have been for some time confuted by the facts.

Thus, in a manner of speaking, organized medicine has not been idle in the constructive development of the great and important field of industrial medicine. But it is that part of organized medicine which is the American College of Surgeons that is entitled to the credit of having been farsighted enough to lay a foundation such that when industrial medicine had grown to its inevitable recognition, it would have beneath its feet a footing of common-sense stability.

The achievement of the College, thus far—it is still midway of its ultimate success—is already of outstanding importance both within and without the medical purview of the field. From the medical angle, it is sometimes not perceived as clearly as it should be that the industrial executive is as important in the existence of a proper medical department as the medical director or chief surgeon is in its conduct. He must be always met, often educated, sometimes persuaded, and, on rare occasions, convinced. The appeal is compounded of medical, economic, humanitarian, and common-sense elements. A remarkable tribute to the integrity of both the Minimum Standard and the methods used in its adoption is inherent in the fact that so many employers had cooperated in advance of the pressure of the occupational disease laws recently enacted. The roll of medical departments approved to date is almost a Blue Book of American business.

DR. NEWQUIST would be very reluctant to have any considerable credit for the success of this undertaking given to him. He didn't do it alone; he was one of a group; his work was only part of the aggregate done by all. The Committee, the late DR. MARTIN, DR. BESLEY, DR. MACEACHERN,

* See page 78.

Dr. Crowell, Dr. Williamson — he was *their* shoulder-to-shoulder associate. That is what he would say for himself. But we would say for him that the man, his name, his personality, his qualifications of mind and temperament, are inextricably woven into the fabric of this remarkable and important achievement. The many of our readers who know him will recognize this; those who do not know him will discover it as they become acquainted with him through the continued enterprise of the American College of Surgeons, and through his identification with the editorial policy of this magazine. From the background of the necessary medical basis, education and a practice of his own, he has become a "career" man in industrial medicine. We are privileged in having him associated with us in our enterprise of publishing this, the Medical Journal of the field of Industrial Medicine, Occupational Diseases, and Traumatic Surgery. His experience and his ability for guidance in the important matters of organizing and maintaining medical departments, and the many problems involved in this now vital necessity of successful industry—will henceforth be more than ever directly available to our readers.

Industrial Medical Meetings

THIS year promises to be a good one for industrial medical meetings. The one, among those now scheduled, which is likely to have the largest attendance is the Twenty-Third Annual Meeting of The American Association of Industrial Physicians and Surgeons in conjunction with the Midwest Conference on Occupational Diseases, at Chicago, on June 6, 7, 8, and 9. The interests of this gathering attract not only the physicians and surgeons, but also the industrial hygienists, the engineers who are cooperating with the physicians in protections and processes for the minimizing of hazards, the industrial nurses—who are coming rapidly to the time of a proper recognition of their importance in industrial health, and the insurance officials—whose work, under the increasing number of laws, is bringing them into more intimate contact with occupational disease problems. There is also an interest for industrial executives; and it is strikingly apparent even at this early date.

But the other meetings, in the list on page 92, are not without their special, though probably more specific, importances. Every one will be instructive and valuable. If there were no other reason to believe this, there is reason enough in the fact that, this year as never before, the Program Committees seem alert to the tremendous informative and educational possibilities of well-planned and well-conducted meetings, and eager to make theirs the best, in all ways, that have been held so far. They have set themselves a high mark, for there have been many meetings during the past few years which will not be easily excelled. But it is true, as the seasons come and go and the conventions punctuate their regularity, that industrial medical men are getting better acquainted, both with their fellows and their problems, which is a great help in the all-important interchange of experiences and opinions that meetings make possible.

AND, too, the Committees are beginning early. We thought Dr. Holmblad's Program Committee and Dr. Sawyer's Exhibits Committee were almost making a record in developing, last December, the organization of the June meeting above mentioned. But here come Dr. George A. Traylor, Chairman, Dr. Oliver B. Zeinert, Vice-Chairman, and Dr. James W. Davis, Secretary, of the Section on Railway Surgery of the Southern Medical Association, with their program completed and their plans all made for the meeting of their Section at Oklahoma City, Oklahoma, *next November*. That kind of preparation calls for superlatives. It seems unnecessary to wish these men success; they have the qualities to command it. It will be a privilege to give them such publicity as we can. They promise us their program for an early issue.

THIS year's meetings are interesting also in another way. So many people seem to be just now "discovering" the field of medical practice which is industrial medicine. It may be quite a surprise to some of them to learn that several of the organizations in this field have a long history. The American Association of Railway Surgeons, for example, will hold its *forty-ninth* Annual Meeting next September; the June meeting of The American Association of Industrial Physicians and Surgeons will be its *twenty-third;* the meeting of the Central States Society of Industrial Medicine and Surgery on May 17 next will be its *nineteenth* annual; the meeting of the New York State Society of Industrial Medicine at Albany next November will be its *eighteenth;* and the meeting of the Association of Surgeons of the New York Central System this year will be its *fifteenth.* This seems conclusive that the field of industrial medicine and surgery has not only been "discovered" but also has done pretty well in development.

Bad Hygiene

HEAVY with the noonday nectar, Jove, among his thunders, nodded — and the world went all awry. It was easy, of course, for him to modify his morrow's potion, but he never did succeed in straightening out his world. This is mentioned only because it *might* have been the point, in far-off time, where personal hygiene and political hygiene diverged—the one to improve until, in this our day, we live in an atmosphere of good-health rules, personal, public, industrial—even economic; the other to get as much worse as there grew to be more of it, until now, if there were such an expert as a "political hygienist" he would have to be first of all a psychiatrist. Possibly, however, this "wonderland" which has been so prolific of other things may yield him yet.

Occupational Diseases and Industrial Surgery

Physical Therapy in Relation to Industrial Medicine

FRANK H. KRUSEN, M.D.*

PHYSICAL therapy, applied intelligently under direct medical supervision, may be of great value in hastening the rehabilitation of those injured in industry. Kessler has pointed out that the end-results of industrial accidents "should be appraised not on the basis of structural changes but on disturbed function." It is in the restoration of function that the use of physical measures is most effective. Some idea of the extensiveness of industrial injuries may be obtained from the estimate of Newquist, who said there were 16,000 accidental occupational deaths during 1935. Of course, the number who were merely maimed or injured were many times this amount.

For the most part, it becomes the duty of the medical practitioner to restore injured workmen to remunerative employment as soon as possible. Shinn has said of industrial medicine that: "Its purpose is to insure good health and prevent injuries, thereby promoting contentment, alleviating suffering and increasing the life span of man. It further deals with the rehabilitation of diseased and injured persons in an effort to insure them a livelihood." It cannot be stressed too strongly that there is great need for all physicians to be familiar with the best and simplest methodist of treating the injured workman. As Sir John Simon has put it: "Measures, whether voluntary or compulsory, for the prevention of industrial disease and ill-health depend primarily on the knowledge, skill and cooperation of the medical profession." The objective to be attained in the treatment of all those injured in industry is the return of the involved worker to normal working status in the shortest possible time. This should be desired by the physician and the injured worker, as well as by the employer.

The chief sphere of usefulness of physical therapy in industrial injuries lies in the treatment of the large group of cases in which there has been trauma to bones, joints, muscles, nerves or skin. Hastening of restoration of articular function is one of the most important phases of this work. Another important contribution of physical therapy is in the rehabilitation of the badly maimed worker, who must be reeducated to make the best use of his limited physical capabilities. Frequently, a properly graduated routine, including surgical treatment, physical therapy, occupational therapy, the sheltered worshop, and a new type of remunerative occupation suited to the handicapped patient's limited ability, will make a happy, useful citizen and worker of a potentially permanent invalid.

Occupational therapy which plays an important part in this transition is a form of physical treatment, and properly administered under medical supervision it will aid greatly not only in restoring function but also in improving the patient's morale. Odencrantz has said: "Anything that can be done to help the handicapped build up his confidence, his morale and his ability, increases his opportunity for satisfactory adjustment."

Because of certain psychic factors which enter into the problem of the injured worker, it is essential that all phases of treatment, and particularly the details of physical therapy, be under direct supervision. No opportunity should be permitted for prolonging such treatment until it becomes a habit, and under proper medical supervision this will not occur. Physical measures should be used only when and as indicated and only when they are producing definite objective improvement. Likewise, during the application of these treatments there is an opportunity for the highly important personal contact between the physician and the patient. Eckelberry has said: "The injured workman may be just a file with a name and number in the insurance office, another case on the calendar at the hearing, and an interesting case to the doctor; but he is nevertheless a human being, influenced by his emotions, subject to hate, fear, doubt and gratitude, even as you and I. To obtain the best results in his management he should be treated as a human being."

Among the physical agents which may be applied with benefit in treating industrial injuries are heat, light, water, electricity, massage, exercise and occupational therapy. The employment of these physical measures, in their simplest form and under close supervision, frequently at the patient's home, is highly to be desired.

The physician should never write an order to some lay technician to give the patient "some physical therapy." This is just as ridiculous as if he were to write a prescription to a druggist to give the patient "some medicine," and the results are likely to be equally as unsatisfactory. The order which is frequently written for B. M. and E. (baking, massage and exercise) with no detailed instructions is likely to prove equally futile.

The Council on Physical Therapy of the American Medical Association has demonstrated that there are many physical agents which, when employed scientifically, are of great value therapeutically. Unfortunately, many physicians are little acquainted with the proper use of physical agents in treating disease because until very recently this subject was much neglected in the medical schools. At present, the intelligent employment of physical therapy in our hospitals and in private medical practice has done much to combat the charlatan who has attempted to worm his way into industrial medicine as well as other phases of medical practice.

The essentials for proper treatment of industrial injuries by means of physical therapy are: (1) devices for the production of the required physical agents (these should be as simply constructed as possible); (2) a physician skilled in the use of these devices and thoroughly familiar with the effects which they can produce; and (3) in many instances (when the physician does not wish to apply treatments himself) a trained technician who has skilled hands for massage and manipulation and who can also use various apparatus as ordered by the physician.

Light Therapy

SINCE the early part of the Seventeenth Century, when Isaac Newton discovered that a beam of sunlight could be split by means of a prism into the various primary colors, a series of subsequentd discoveries have developed a huge electromagnetic spectrum with varying physical properties which physicians have learned to use in treating disease. Below the red end of Newton's rainbow were found invisible infra-red (heat) rays, and above the violet end were found invisible ultra-violet (chemical rays). Below the infra-red rays are Hertzian waves, which physicians now utilize for short-wave diathermy. Above the ultra-violet rays lie the roentgen rays (physical rays whose therapeutic value is familiar to all physicians), and beyond these lie the gamma rays of radium (the therapeutic value of which is also well known).

Today, the injured workman may be instructed to buy a simple heat lamp which will produce either near or far infra-red rays for medical treatment. These infra-red lamps (heated by resistance coils) do not vary greatly from the ordinary household heater with the exception that the latter has a wider reflector which diffuses the heat through the room, while the therapeutic lamp has a more convex reflector which

* From the Section on Physical Therapy, The Mayo Clinic, Rochester, Minnesota. Read before the annual meeting of the Minnesota State Medical Association, Saint Paul, Minnesota, May 5, 1937; and published in *Minnesota Medicine*, January, 1938.

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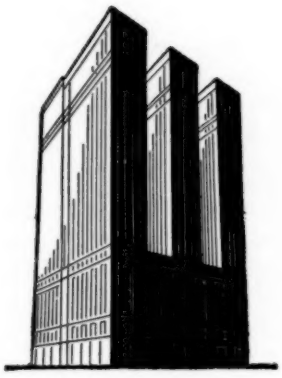

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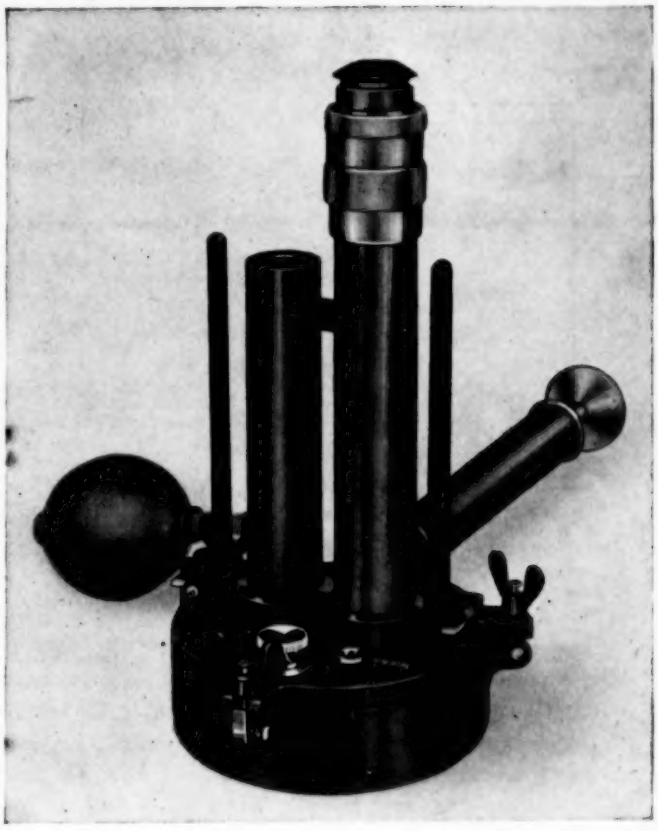

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ANNUAL MEETING

THE 1938 Annual Meeting of the American Association of Industrial Physicians and Surgeons, and the 1938 Midwest Conference on Occupational Diseases, will be held at the Palmer House, Chicago, June 6, 7, 8 and 9, 1938.

localizes the radiation of heat on the body surface. The so-called infra-red units (heated coils or plates) and luminous bulbs (carbon or tungsten filament lamps) may be used in the same convex reflector. The former produce less penetration of heat and more surface heat; the latter produce more hyperemia and slightly more penetration. Large lamps which have big reflectors may be used to treat extensive lesions. For use in the home, a simple home-made baker may be constructed by any tinsmith at a cost of two or three dollars. These various heat lamps will be found extremely valuable in producing surface hyperemia to relieve the pain of sprains, contusions, fractures, and certain inflammatory lesions.

In indolent wounds and in certain types of ulcerations and lesions of the skin, the ultra-violet rays produced by a mercury quartz or by a carbon arc light may be found useful.

Times does not permit a complete consideration of all the indications the use of light rays in industrial diseases; nevertheless, many uses are known.

Heat Therapy

ONE of the simplest and most effective methods of applying heat locally is by means of the paraffin bath. Extremities may be dipped in melted paraffin, a coating of which is left on the part for 20 to 30 minutes. A glove or boot of paraffin is formed, which may be stripped off with ease at the end of the treatment. This leaves a marked hyperemia of the skin. The paraffin may be painted on a shoulder, arm or back and later removed, leaving a warm reddened skin which is ideally prepared for massage.

Hydrotherapy

ONE of the easiest ways of stimulating peripheral circulation is to apply the time-honored contrast baths. These are applied to the extremities, by using buckets or pans as containers for the hot and cold water. If a shoulder or some portion of the trunk is to be treated, an ordinary bath spray may be used to apply hot and cold water alternately to the affected region. This will produce effects comparable to those achieved by immersion contrast baths.

Whirlpool baths (baths of whirling, aerated water at a temperature of 110° F.) are excellent for the auxiliary treatment of fractures, preliminary to massage and therapeutic exercise. These baths may be constructed for a few dollars by any plumber (specifications may be obtained from the Secretary of the Council on Physical Therapy of the American Medical Association.)

Recently, underwater exercises have been used not only for the treatment of poliomyelitis but also for the treatment of extensive trauma. The patient is placed in hot water in a specially constructed tub known as

a Hubbard tank. In this hot water the muscles usually relax, and massage is administered under water during the period of maximal heating. Exercises under the water are readily performed because of its bouyancy and it is possible to secure activity in all planes.

Electrotherapy

THE use of short wave diathermy, although much exploited, nevertheless must be considered favorably in the treatment of many types of deep trauma to soft tissues. The effects are explained merely on the basis of heating of the tissues, but this heating has been proved to reach to deeper levels than can be obtained by any other means of application. In most instances, an induction coil, cuffs, or air-spaced electrodes should be applied to the area to be treated.

Massage and Corrective Exercise

STEVENS in discussing the use of physical therapy in industrial injuries pointed out that by far the most valuable service which such therapy renders is in "the preservation and restoration of joint function."

Stevens believed that the technician skilled in massage and manipulation was the "*sine qua non* of the physical therapy set-up." In this I can heartily concur. I agree also with certain of his conclusions, namely, that "joint restriction can often be prevented by early motion which stimulates rather than hinders repair"; that "the use of apparatus has definite value but only as a preliminary to skillful manipulation at the hands of the physician or well-trained technician"; and that "active use of the part, preferably under the supervision of an occupational therapist, is a necessary supplement to other physical therapy procedures."

Occupational Therapy

OCCUPATIONAL therapy should be administered in conjunction with other physical measures. Devices such as the shoulder loom may be used to hasten the return of articular function in a most agreeable manner. Occupational therapy plays an important part in re-educating those who have been severely maimed in industrial accidents.

Stroud said: "The majority of the handicapped who may be rehabilitated and placed in industry are those with cardiovascular, arthritic and orthopedic disabilities." He has recommended training in occupational therapy followed by work in sheltered workshops as a means of fitting patients for suitable industrial positions.

Eckelberry has said, "One of the greatest aids in rehabilitation is the opportunity for the workman to resume work of a lighter character than his usual job and . . . gradually to approach the same work and activity he enjoyed prior to the accident."

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Conclusions

THE use of physical therapy may be of considerable value in the treatment of industrial injuries.

2. This type of therapy is particularly applicable to the hastening of restoration of function following trauma and to the rehabilitation of the severely handicapped patient.

3. The application of physical masures should be under close medical supervision, and specific instruction concerning treatment should always be given.

4. Many simple physical devices may be utilized in treating industrial injuries; these devices may frequently be constructed for home use.

5. Massage and manipulation must always be performed by skilled hands.

6. Occupational therapy in conjunction with other forms of physical therapy plays an important part in the rehabilitation and return to industry of the severely handicapped worker.

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Doctors as U. S. "Officers"

IN THE Senate of the United States, on July 22, 1937, James Hamilton Lewis (D), Illinois, introduced the following joint resolution, which was read twice and referred to the Committee on Finance:

Whereas, the Federal Government has recognized its social responsibilities to the citizens by the enactment of the Social Security Act; and

Whereas, an extension of such responsibilities is necessary to provide adequate medical care and attention for the impoverished and needy to assure the full enjoyment of social security; therefore, be it

Resolved by the Senate and House of Representatives of the United States of America in Con-

gress assembled that all physicians and surgeons who practice the profession of medicine or surgery in the United States or its territories are hereby declared to be civil officers of the United States for the purposes of this Joint Resolution.

Section 2. Any such physician or surgeon shall render such medical or surgical aid requested of him by any impoverished individual who is in need of such aid, and where necessary to order the hospitalization of any such individual. Any hospital to which such an order is directed shall, in so far as its facilities permit, provide for the hospitalization and care of any such individual in the manner best adapted to accomplish his recovery.

Section 3. Any physician, surgeon, or hospital rendering aid to impoverished individuals as provided in Section are authorized to make such charges for such aid as are reasonable and just. Bills for such charges shall be submitted to the Social Security Board, which is authorized and directed to pay them, under such rules and regulations as it may prescribe.

Section 4-A. It shall be unlawful for any physician, surgeon, or hospital official, or employee, to refuse to render aid as provided for in this Joint Resolution, or to make exorbitant or excessive charges for such aid, or to make any charge against an individual to whom aid has been rendered in addition to the charge paid by the Social Security Board.

B. It shall be unlawful for any person fraudulently to represent that he is impoverished for the purpose of receiving aid under this Joint Resolution.

C. Any person violating any of the provisions of this Joint Resolution shall be deemed guilty of a misdemeanor and, upon conviction thereof, shall be fined not more than one thousand dollars, or imprisoned not more than three months, or both.

Section 5. The Social Security Board shall have power to make such rules and regulations as may be necessary to carry out the provisions of this Joint Resolution.

Section 6. There is hereby authorized to be appropriated such sums as may be necessary to carry out the provisions of this Joint Resolution.

FOLLOWING is what the Illinois State Medical Society thinks of the foregoing resolution:

WHEREAS, Senate Joint Resolution 188, introduced in the Senate of the United States by Senator J. Hamilton Lewis of Illinois proposes to federalize the medical profession of the nation, making every licensed physician and surgeon a civil officer, and subject to prosecution and penalization in the Federal courts for special causes enumerated in the resolution; and

WHEREAS, such action being clearly a case of class legislation, is con-

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trary to the principles of constitutional government; and

WHEREAS, the obligations imposed by the joint resolution upon each licensed physician of rendering needed medical service to any and all impoverished who make application to him would inevitably overwhelm practitioners of outstanding reputation, create the necessity of elaborate machinery to determine who would qualify as impoverished, or, in lieu thereof, open the way for fraudulent practices, political interference, and tend to lower the standards of medical practice; and

WHEREAS, the authority reposed by the joint resolution in the Social Security Board would lead almost certainly to fee fixing by governmental agencies, and would necessitate a nation-wide accounting and investigating system that would add a tremendous indirect cost to the nation's bill for medical care; and

WHEREAS, the penalties imposed by the joint resolution on persons who violate the provisions thereof are so exorbitantly severe as to create a detrimental and inimical psychology in the medical profession; and

WHEREAS, the proposed plan would lend itself easily to political abuse and become a stepping stone to communistic and socialistic government; and

WHEREAS, poverty itself is the fundamental cause of most of the ills which the joint resolution seeks to cure and prevent through the superficiality of a super-imposed medical service; and

WHEREAS, the proposed plan would inevitably become a bitter cup of belated disappointment to thousands of poor and needy people who pin their faith of salvation from the tribulations of life upon this scheme, even as the Townsend mirage and the Huey Long "Share the Wealth" hallucinations became; and

WHEREAS, the enforcement of local laws already on the statute books would provide as adequately for the poor sick as modern facilities and circumstances make practicable; and

WHEREAS, the needy now enjoy as adequate medical care as economic limitations and the vagaries of human nature would make possible under the proposed plan; therefore, be it

RESOLVED by the Council of the Illinois State Medical Society in regular session assembled that Senate Joint Resolution 188 is inimical to the best public interests, is un-American and unworkable, would result in monumental expenses without yielding compensating benefits, would lead to political corruption and tyranny, and ought to be defeated; and be it further

RESOLVED that copies of these resolutions be forwarded to the President of the United States, to each Senator and Representative in Congress from Illinois, and to the

Secretaries of the Medical Societies of the several States.

THE Delaware State Medical Society adopted the same resolution, substituting its own name for that of the Illinois State Medical Society.

Apropos of the general plan, of which Sen. Lewis' resolution is a part, the editor of *Delaware State Medical Journal* says, pointedly:

"As to the problem of adequate medical care, more than half of it is an economic problem that industry, agriculture, etc., must solve; the remainder of the problem can and will be solved by the medical profession, *if it is not interfered with.*"

Medical Care for All the People

UNDER the leadership of many county medical societies, with the approval of the state medical societies and in accordance with the actions of the House Delegates of the American Medical Association, definite provisions for medical service to the indigent and to those partially able to pay have already been established in various parts of the country.* Hundreds of such plans have been reported to the Bureau of Medical Economics of the American Medical Association and many of them have been described from time to time in considerable detail in the Organization Section of *The Journal*. In the state of Pennsylvania 17 counties now have such plans actively in effect. In the state of Iowa many county medical societies have taken over completely the medical care of the indigent. In Kansas, in California, in Michigan, in Missouri and in many other states, plans already functioning seem to have solved to a large degree the question of preventive medicine and medical care for the people covered by these plans.

At its annual session in June, 1937, the American Medical Association reaffirmed its willingness to do its utmost today, as in the past, to provide adequate medical service for those unable to pay either in whole or in part for medical care. At that time the American Medical Association also officially reaffirmed its willingness, on receipt of direct request, to cooperate with any governmental or other qualified agency and to make available the information, observations and results of investigations together with any facilities of the Association. The Social Security Board, the United States Public Health Service, the bureau devoted to maternal and child welfare in the Department of Labor, and many other government bureaus, commissions and agencies are known to be engaged in studies of health services which may yield information of importance in planning for the future. Thus far no call has come from any governmental agency for the co-

* Editorial, *J.A.M.A.*, January 15, 1938.

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operation of the American Medical Association in studying the need of all or of any groups of people for medical service, or to determine to what extent any considerable proportion of our public are suffering from lack of medical care.

At the meeting of the American Public Health Association, held a few months ago in New York City, an address was made by Miss Josephine Roche, third assistant secretary of the treasury and in charge of the United States Public Health Service, in which she emphasized to that organization the importance of determining and meeting as soon as possible the actual needs of the indigent and of those partially indigent in relationship to medical care. Moved perhaps by her appeal, the American Public Health Association appointed a committee to confer with the Board of Trustees and the officers of the American Medical Association with a view to stimulating medical organizations everywhere toward greater activity in this matter. That committee met with the Executive Committee of the Board of Trustees of the American Medical Association in Chicago late in December. As a result of that conference the following resolutions were adopted:

WHEREAS, A varying number of people may at times be insufficiently supplied with needed medical service for the maintenance of health and the prevention of disease; and

WHEREAS, The means of supplying medical service differ in various communities; be it

RESOLVED, That the American Medical Association stimulate the state and county medical societies to assume leadership, securing cooperation of state and local health agencies, hospital authorities, the dental, nursing and correlated professions, welfare agencies and community chests in determining for each county in the United States the prevailing need for medical and preventive medical service where such may be insufficient or unavailable; and that such state and county medical societies develop for each county the preferable procedure for supplying these several needs, utilizing to the fullest extent medical and health agencies now available, in accordance with the established policies of the American Medical Association. Be it further.

RESOLVED, That the Board of Trustees of the American Medical Association establish a committee to cooperate with the Bureau of Medical Economics in outlining the necessary procedures for making further studies and reports of the prevailing need for medical and preventive medical services; and that the Secretary of the American Medical Association arrange to develop such activities through the secretaries of state and county medical societies in each instance, urging the formation of special committees in each county and state where committees are not available for this purpose.

The undertaking proposed by this resolution is an attempt to apply on a nation-wide scale the best features of the numerous plans already in effect, utilizing in each county to the fullest extent the resources there available. Thereby it becomes possible for the organization to act specifically as a clearing house in the initiation, development and functioning of what may well evolve into a comprehensive system of medical care for all the people according to American medical practice.

Detection and Treatment of Carbon Monoxide Poisoning

ROBERT T. LEGGE, M.D.,*
Professor of Industrial Hygiene,
University of California

TODAY carbon monoxide poisoning ranks first among the industrial hazards, as well as claiming a great quota of the domestic fatalities in the modern home. Wherever incomplete combustion of carbonaceous materials in industrial processes takes place, as in the burning of fuel, such as charcoal, wood, oil and gas, or in explosions of powder with the resulting smoke, carbon monoxide is given off. Gas engines with their discharging exhausts, heating aparatus, stoves and illuminating gas as found in our homes, are constant sources of production of this deadly poison.

The general use of automobiles and other gasoline burning engines whose exhausts contain 7% of carbon monoxide, and the consequent vitiation of the atmosphere in garages, traffic tunnels and congested thoroughfares, have given public health and industrial hygienists much concern. A recent average of 141 tests made by U.S.P.H. chemists in city streets at peak hours of traffic showed a contamination of 0.8 in 10,000 parts of air, while in 102 tests made in 28 garages taken in 14 different cities, the average carbon monoxide content was 2.1 parts in 10,000. One of the greatest dangers to life is encountered in warming up an engine in the small closed garage —a hazardous act that should be given universal publicity. Coroner reports annually record the increased fatalities as a result of idling a running motor in a garage. It has been estimated that a motor will discharge two feet of carbon monoxide every minute, so that in 20 minutes the atmosphere would be concentrated enough to kill a dog by asphyxiation.

From an industrial hygienist's view, the amount of carbon monoxide permissible for workers to be exposed to should not be more than one part in 10,000 parts of air. Every industrial physician and employer should be familiar with the approximate amount of carbon monoxide eliminated in the special processes of manufacturing at his plant. Whenever carbon-containing fuels are burned, such as coal, gasoline, oil or charcoal, without sufficient oxygen to oxidize the fuel completely, carbon monoxide is liberated. The various industrial processes, such as furnaces of all kinds, explosions, blasting, gas works, heating and oil distilling plants, furnish many cases of poisoning from this colorless, tasteless, and odorless gas.

The diagnosis of carbon monoxide rests mainly on a history of possible exposure and the presence of carbon monoxide in the blood either before or after death. At autopsy, the noticeable evidence observed is the preservation of the body from decomposition, the cherry red color of the organs, tissues and blood, and the fluidity of the latter; there is no question that it is CO poisoning. It is important to note that the greatest changes in the tissues found at postmortem, are those of fatty degeneration of the heart, kidney, walls of blood vessels and other tissues. Minute hemorrhages throughout the brain are common. This one poisonous feature of carbon monoxide, i.e., the fatty degeneration of organs, may explain and have some bearing on the increase in the mortality of heart disease statistics.

The detection of carbon monoxide is very important in order to avoid exposure. Every industrial precaution should be studied and observed. Normally the gas is odorless, except when mixed with other gases as in the case of common illuminating gas which contains 30% CO. In mines, canary birds or mice are used to detect dangerous atmospheres. These animals are 20 times more susceptible than man. A bird will show signs of distress when exposed for one hour to 0.1% of CO. The Bureau of Mines has developed a detector which will give immediate positive results with carbon monoxide in the air in concentration of .07% or more. This is known as hoolamite, or the activated iodine pentoxide indicator, perfected by Teague, and a proved instrument of great value in mine rescue work and in testing plants where this hazard prevails.

Sayres and Yant developed one of the simplest instruments for an accurate and rapid method of determination of carbon monoxide in the blood, known as the pyrotannic detector. Any miner, fireman, or

* Read before the Utah State Medical Association, September 2-4, 1937; published in *Rocky Mountain Medical Journal*, January, 1938.

nurse can use this simple instrument whenever a person is overcome, especially if there is any doubt as to whether carbon monoxide is the responsible factor. This instrument was developed as a result of the fact that normal blood is completely decolorized when treated with pyrogallic and tannic acid, while blood containing carbon monoxide is not decolorized. A specimen of blood is taken from a punctured finger or ear of the victim by being drawn into a dilution pipette measuring 0.1 cc. of blood in the capillary stem, and a bulb above that has a total volume of 2 cc. when filled with water, thus making a dilution of one in 20. A small amount (.04 grams) of the pyrogallic-tannic acid mixture is added to the sample of diluted blood, agitated in a small test-tube, and after allowing it to stand 15 minutes, the color in the sample under test is compared with a set of standard color tubes, which correspond to given percentages of carbon monoxide in the blood, ranging from zero to 100%. The instrument will detect a .01% saturation of the blood with carbon monoxide. From the blood saturation percentage one may be able to foretell the resultant symptoms; for example, 20 to 30% would produce headache and throbbing temples, while 70% to 80% would produce coma, intermittent convulsions, cardiac and respiratory depression, and possibly death.

The symptoms of carbon monoxide poisoning may be divided into two stages. In the first stage there is a feeling of tightness across the forehead, dizziness, frontal and basal headache, smarting of the eyes, lack of proper muscular coordination, nausea or vomiting, with increased pulse and respiration. In concentrated atmospheres, the victim, due to rapid poisoning, may develop syncope at once, without any of the early symptoms. When a pregnant woman is exposed to carbon monoxide it may result in the death of the fetus in utero with subsequent miscarriage.

In the second stage the symptoms are characterized by loss of muscular control, especially of the sphincters, loss of reflexes, low blood pressure, coma usually with intermittent convulsions, shallow and irregular breathing, and finally cessation of respiration. In general, the predominating symptoms depend upon the percentage of blood saturation. The effect of carbon monoxide on hemoglobin is the primary pathology. It has been shown that exercise and high temperature and humidity cause a more rapid combination of carbon monoxide with hemoglobin than when the subject remains at rest.

Physiologically, the tissues of the body derive their oxygen from the oxy-hemoglobin of the red blood cells. Carbon monoxide has an affinity for hemoglobin 300 times greater than oxygen. It is for this reason that when the oxy-hemoglobin molecule becomes disassociated with carbon monoxide the tissues no longer are nourished by oxygen and asphyxiation results. The damage that is done to the brain and other organs is directly the result of oxygen privation. When 60 to 80% of the red cells are saturated death usually ensues. The sequelae of a severe gassing of CO are pneumonia, blindness, neuroses, and muscular irritability and mental instability that may be permanent. Secondary effects are sometimes delayed for days after apparent recovery and these may be permanent as in cases of deranged mental and nerve conditions. When coma is present after 24 hours the prognosis is unfavorable.

Methylene blue was advocated and condemned as a therapeutic agent for CO poisoning, notwithstanding the reported cases in which it was tried, and the research laboratory evidence which was conclusive.

Research must continue to develop some chemical agent that can be conveniently administered intravenously that may act as a catalyst, to change or release the fixed carboxyhemoglobin quickly to normal oxygen-bearing hemoglobin before permanent pathology and its resulting damages ensue.

The regulation method of resuscitation after the patient has been rescued from the carbon monoxide is to induce artificial respiration by the Schaffer method, and the inhalation of oxygen gas or preferably oxygen mixed with 5% carbon dioxide as advised by Henderson and Haggard, of Yale. The purpose of this method of treatment which has to be maintained for some time, is to supply oxygen and lung ventilation until the blood is able to establish normal oxyhemoglobin and overcome asphyxiation.

As the successful recovery from carbon monoxide poisoning depends upon the early elimination of the poison from the blood, it is therefore absolutely imperative to increase the rate and depth of the respiration by the administration of pure oxygen or the 5% carbon dioxide oxygen mixture. The latter mixture causes the elimination of carbon monoxide five times as fast as normal air.

Every physician, industrial plant, and local hospital, police and fire department, should keep on hand an H. & H. Inhalator with the carbon dioxide oxygen mixture to be ready for emergency service in the treatment of this common and dangerous poison. For a respiratory stimulant the hypodermic use of alpha lobelin is advocated. Care must be maintained to keep the patient warm, quiet, and in recumbent position. During convalescence plenty of rest must be insisted upon.

Allergic Diseases in Relation to Occupation

MAY R. MAYERS, M.D.,*
Division of Industrial Hygiene,
State of New York Department of Labor

SINCE dermatitis venenata was added to the list of compensable diseases in 1930, the question of allergy in its relation to occupation has been the subject of considerable controversy. The new amendment to the Workmen's Compensation Law granting compensation for all illness arising out of occupation, has focused attention upon another of the allergic diseases, namely asthma. The question which immediately arose as to whether or not is may properly be regarded as an occupational disease has been answered in the affirmative.

Although dermatitis venenata and asthma appear to be entirely dissimilar to the layman—the former being a skin rash, and the latter a series of paroxysms of coughing—medically they are both closely related, in that they are merely different types of reactions on the part of the allergic individuals to substances to which they are hypersensitive.

Volumes have been written on the subject of allergy, and some discussion of it has appeared in previous issues of *Industrial Bulletin* in connection with dermatitis venenata. It is not the intention here, therefore, to discuss the subject at length, but rather to direct attenion to those aspects which might help to clarify some of the compensation problems which have arisen.

Allergic Individuals

ALLERGIC individuals are persons who are peculiarly hypersusceptible to certain of the substances with which they come in contact. These substances may include foods of all sorts, drugs, various types of vapors or dusts including the pollens from plants, chemicals applied to the skin, etc. A large number and variety of substances may thus be responsible for allergic reactions in susceptible individuals — substances which may be entirely innocuous or even of positive benefit to other people.

The types of reactions of such individuals to a given substance may also vary greatly both in kind and in degree. Thus eating certain foods may cause serious gastro-intestinal disturbances in some individuals. Others who are hypersensitive to the same foods may manifest their intolerance by developing urticaria—a skin eruption commonly known as "hives." Still others under precisely

* Published in *Industrial Bulletin*, December, 1938.

the same circumstances may develop asthmatic attacks, with or without any rash or gastro-intestinal upsets.

On the other hand, asthmatic attacks may also develop from contact with dusts of various kinds. Baker's asthma, the asthma of stablemen from exposure to horse dander, and of furriers from exposure to fur dust, are well known clinical entities directly related to occupation. Other persons cannot keep animal pets, or sleep on feather pillows, without having acute attacks of asthma.

Hay fever is still another type of reaction on the part of certain individuals to dusts. In those cases, the dusts are more often in the nature of pollens from plants. However, hay fever may be caused by other types of dusts, and may or may not be associated in the same individual with urticaria, asthma or other allergic manifestations.

Poison ivy, with which most people are familiar, causes a characteristic skin eruption which occurs in persons who are sensitive to the oil in this plant. This skin eruption is technically known as dermatitis venenata, and may be produced by a tremendous variety of other substances in persons who happen to be hypersensitive to them, regardless of how innocuous they may be to most people. Contact with many of these substances may occur in the course of a worker's occupation.

Thus the precise manner in which a given allergic individual may react to a substance to which he has become sensitized cannot be predicted in advance. He may react in any one or any combination of ways indicated.

Persons Born Allergic

IT IS believed that allergic individuals are born with this type of hypersensitivity, and it is primarily for this reason that the question is so often raised as to the true relation of allergic diseases to occupation. The fact is, however, that though certain individuals are born allergic, they do not become hypersensitive to the substances which later cause the trouble, until they have had sufficient contact with them to become sensitized. In other words, when an individual who is hypersensitive to a given substance first comes in contact with it, he is not aware of any difference between himself and anyone else in relation to this substance. A so-called "incubation period" is required during which time reepated contacts sensitize him to a point where subsequent contacts will usually result in immediate allergic reactions of one type or another. The length of the incubation period may vary from a week or two (which is the most common) to several months and even years. The intensity of the reaction, and the duration of the contact necessary to elicit it, will vary with the degree of sensitivity of the individual, the intensity of the exposure, whether or not it is intermittent, and other factors which are too technical for the present discussion. The type of reaction which will occur in such an individual — i.e., whether he will develop a skin rash, a gastro-intestinal upset, an attack of asthma or what not — is a purely individual response on his part, which bears no necessary relation to what another allergic individual might do under similar circumstances.

Whatever the precise allergic manifestations turn out to be in a given case, the allergic tendency must have been there to begin with; and superimposed upon that, there must have been continuous or intermittent contact with the substances in question in order that sensitization shall have occurred and his latent allergic tendencies brought out.

Relation to Occupation

IT IS here that the person's occupation comes into the picture. If it can be shown that the sensitization has occurred in the course of his work and was actually due to substances with which he came in contact there, causal relation is established. It is always important, however, in these cases to be sure that sensitization has not occurred elsewhere or to substances other than those with which he was working. In the case of persons suffering from dermatitis venenata, it is the practice to make patch tests with all suspected substances in order to determine which of these, if any, appears to be responsible for the trouble. In the case of persons suffering from asthma, other types of skin tests are equally available for purposes of differential diagnosis. While asthma may very truly be an occupational disease in a given case, this must always be proved. There will be many cases where it can be shown without a doubt that there was no possible relationship between the patient's asthma and his work.

Asthma differs in a very important respect from such general ailments as colds, rheumatism, etc., for which compensation is claimed and which are not regarded as peculiar to the person's occupation. Colds may be contracted anywhere outside the workroom. Rheumatism may become aggravated by exposure to damp and cold. Such exposure to cold and damp may occur while at work, but it may also occur outside the workroom.

A worker exposed to formaldehyde in the course of his work, however, who contracts asthma as a result of sensitization resulting from such exposure, could not have contracted it outside of his workroom—since there is no corresponding exposure to this substance on the outside. Such a case of asthma cannot but be regarded as "peculiar" to his occupation.

Polyvalent Sensitivity

A VERY difficult medical aspect of the situation is the fact that once a person has become sensitized to a given substance, he may then more readily than before become hypersensitive to other substances. This is known as polyvalent sensitivity. Where there is sensitivity not only to a substance with which a person works, but to other substances as well, the determination of whether the allergic response which is disabling is due to the person's work or not can be made only after very careful study of the particular case in question.

From the standpoint of prevention, it would seem quite clear, from the foregoing, that allergic individuals who have become sensitized to certain substances in the course of their work, should not be permitted to go on working with them. In the case of dermatitis venenata, occasional individuals are apparently capable of developing a certain degree of immunity as time goes on. Most persons, however, suffering from allergic diseases tend on the whole to become more sensitive if exposure continues, and they should be strongly urged to go into other lines of work, even though this may involve a reduction in their earning capacity during the period of transition.

The Toxicity of Organic Silicates

ORGANIC compounds of silicon are employed industrially at present chiefly as solvents, components of paint and preservatives of stone.* The toxic properties of one such organic compound, ethyl silicate (tetraethyl-ortho-silicate), have recently been studied by Kasper, McCord, and Fredrick[1]. When this substance was administered to 228 small animals (rabbits, guinea pigs and rats) at various intervals by the intravenous, intraperitoneal, subcutaneous, intratracheal or oral route it was found highly injurious. The minimal lethal dose for rats when introduced intraperitoneally was approximately 0.6 cc. per kilogram of body weight and with rare exceptions death took place within four days. The chief initial action of ethyl silicate is centered in the pulmonary tract, regardless of the method of introduction. Rupture of the terminal capillaries is accompanied by pulmonary hemorrhage, often in association with anemia, hematuria or secondary pneumonia. Pulmonary hemorrhage may be demonstrated within 10 minutes after intraperitoneal injection, but other than trivial reaction in the peritoneal cavity is lacking. In animals surviving the effects of the primary action of ethyl silicate, acute nephritis may be dem-

* Editorial, *J.A.M.A.*, January 22, 1938.

1. KASPER, J. A.; MCCORD, C. P., and FREDRICK, W. G.: "The Toxicology of Organic Silicon Compounds," Detroit Department of Health; published in INDUSTRIAL MEDICINE, December, 1937.

onstrated. As far as animal experiments can demonstrate, ethyl silicate possesses no properties similar to the slow action of silica in producing silicosis, but it does display a high degree of toxicity, acute in nature and possibly, but not yet so demonstrated, related to the slow action of silica.

Cold Vaccine

DR. GEORGE E. ROCKWELL and HERMAN C. VAN KIRK, M.Sc., Cincinnati, in *Journal of Laboratory and Clinical Medicine*, tell of their studies of 191 patients afflicted with colds, treated by cold vaccine taken by mouth:*

"The patients came from various walks of life—boys in an institution, office workers, medical students, factory workers and school children. In each of these groups half the persons took the vaccine and the same number acted as controls (did not take the vaccine). The patients using the vaccine took one capsule with a half glass of water at least one hour before breakfast every morning for seven mornings, after which one capsule per week was taken throughout the season. One hundred persons took vaccine and 100 did not (controls). All had suffered with about the same number of colds each year in the past.

"Results: During the experimental year the controls (ones who didn't use the vaccine) had 375 colds, whereas the ones who took the vaccine had a total of 94 colds—a decrease of about 75%. There was also a very marked decrease in days of illness from all causes among the vaccinated group as compared with the controls."

* Quoted by DR. JAMES W. BARTON in "Your Health."

The Nurse Stimulates Employee Interest in Safety

ERNEST AUGUSTUS,*
Safety Director, The Mead Corporation, Chillicothe, Ohio

THERE is practically no limit to the ways in which an industrial nurse can be of help in arousing and maintaining employee interest in a plant safety program, if she has the proper personality, an enthusiastic interest in her work, sound technical training and ability to perform her duties properly, plus a generous supply of initiative and originality, and if management lends its active support to the program.

As each one, or all, of these essential qualifications may be lacking, to the same extent must it become increasingly difficult for the nurse to fit into the safety picture properly. In the first place, it is absolutely essential that the nurse be sold 100% on safety and the safety program.

Attracting attention to a particular thing or objective, arousing interest in it, and creating a desire for it to that point where the prospective customer is stimulated to take positive action in trying to obtain the thing desired—these are the fundamental principles of good advertising and successful salesmanship. Promoting employee interest in safety is primarily the job of advertising and selling an idea. To interest others we must first be interested ourselves.

Interest in safety is like a contagious disease; it spreads by contact. The industrial nurse, perhaps more than anyone else in the organization, can help insure uniform and effective spreading of interest. She should have sales ability of the highest order. To create and help maintain interest in safety, she must first create and sell good will.

She must be temperamentally fitted for her work. She should be slow to anger, assuming almost the hotel attitude that "The guest is always right." She must not close her ears to constructive criticism, but must let ordinary mumblings go over her head unnoticed. The employee must be the final judge of her ability to render service, and he is frequently a hard taskmaster. He is not easily fooled. He has a way of knowing whether sincerity prompts her actions.

The industrial nurse should be able to understand the psychology of each employee who comes to her for treatment or who comes merely to seek advice or ask for information. She must never show any bias, and above all she must remember that each employee is different, psychologically, and that it is essential for her to adapt her approach in each case to the reactions of the employee toward his particular problem.

The nurse makes a contact with the employee in a manner no one else in the organization is able to do, and frequently she may be able to give him bits of advice that will help him solve some of his most perplexing problems. By advising and reassuring the employee who has sought her assistance she can frequently relieve a worried mind; and putting a troubled mind at ease is often worth more than physical remedies.

Through her keen observation and sincere personal interest in the employee, she can gradually build up a feeling of confidence and good will which will go a long way in interesting the employee in her service and in the safety program of which she is such an important part. The employee will be encouraged to return for further treatment or to seek further advice and information, or perhaps to report some unsafe practice or condition which he has noticed.

The industrial nurse must have a sincere interest in her fellow men, and a willingness to treat all alike. She should have professional dignity and at the same time a tolerance toward to workers which will not permit pettiness or gossip. She can retain this dignity and still be friendly and sympathetic, but not intimate.

She should have a sense of humor and a keen understanding of people. She should be eager to learn and to teach. She should be qualified in all respects to join the personnel director, the safety director, the company physician, and the various supervisors and foremen, as a member of the teaching faculty in the school of "human engineering."

It is important that the wants of the employee be attended to as promptly and as gently as possible. Employees should never be kept waiting for a treatment or an interview any longer than is absolutely necessary. Five minutes can seem like an hour to the man waiting to have a cut finger or mashed toe dressed and bandaged. The longer he waits the more will he be likely to doubt the sincerity of the nurse's interest in his personal welfare and comfort, and the less likely will he be inclined to follow her advice or seek her assistance the next time.

The nurse must impress upon every employee with whom she comes in contact the fact that so-called trivial injuries must be cared for immediately. She should constantly stress the fact that the smallest wounds are large enough for thousands of germs to enter, and that infections can start within a very short time.

Another important point is the treatment of people who suffer slight injuries shortly before quitting time. These employees should be made to understand that they are to visit the first-aid room and receive treatment before going home.

Since men are more likely to talk about an accident and tell the real facts at the time the nurse is treating them than two hours after it has happened, the nurse has an excellent opportunity while giving a man first aid to get *his* story of how he was hurt. She may not learn from him the fundamental or underlying causes of the accident, but she can get a much better story from the injured worker's viewpoint than any other person in the plant. The very nature of her job inspires his confidence. He will talk more freely to her than to the foreman who may criticize him for participating in an accident, or to the safety engineer,

* Presented before the Industrial Nursing Section, National Safety Congress, Kansas City, Mo., October 13, 1937, and published in *Public Health Nursing*, January, 1938.

who has an interest similar to that of the foreman and who likewise may be prejudiced.

While getting the employee's story, the nurse can diplomatically impress upon him the idea that carelessness does not pay. She can also draw from him his idea of what actually caused the accident and how similar accidents may be avoided in the future. The fact that someone has time to listen to his side of the story and is apparently interested in having his suggestions as to how a recurrence can be avoided, is bound to stimulate his interest in safety.

The nurse, without violating the confidence of the employee or involving him in any manner, can tactfully pass along the information thus gained to the safety director and others for further investigation and action.

The nurse should keep the foremen informed of the psychological reactions of those coming to her for attention. In this manner the foremen know better how to handle certain employees under certain conditions. Likewise, she should assist the company physician in making physical examinations and know the special conditions found in each employee. Then she can use her influence in getting employees to follow the doctor's advice in having certain conditions corrected.

The safety director should keep the nurse informed of his program and aims, so that she may assist him in his plans. In reality the nurse should be looked upon as an assistant to the safety director.

Many nurses find it advantageous to have a bulletin board in the treatment room, on which are displayed frequent changes of safety posters. A man looking at a bulletin-board poster in the first aid department is likely to be in a more receptive mood than when looking at it on any other board in the plant. Many nurses have found it worth while to call the employees' attention to particular posters which she has selected for her bulletin board. Sometimes the nurse selects for display posters dealing with the types of injury most frequently treated by her. Thus the safety posters are tied in directly with her work.

The keeping of records is another important function of the plant nurse. An accurate and complete record should be kept of every injury reported—when, where, and how it happened, and the treatment rendered, including redressings.

The employee who has been trained to realize the advantage of visiting the first aid room and who knows a record is being kept of all such visits, cannot help showing a greater interest in safety than the employee who has not been so trained. His desire is naturally to keep his record as commendable as possible.

Records kept by the nurse can also be used by the safety director and department supervisors in helping to reduce certain types of injuries. Each minor injury should be looked upon as an accident. These should all be classified by types and causes for the use of the safety department, as a help to formulating new rules and general safety policies. First aid records kept by the nurse might well be used as the basis for a systematic accident prevention program.

In this connection the nurse should be familiar with the records of various departments and should diplomatically call employees' attention, at the proper times, to either good or bad records. Similarly, if other forms of interdepartmental competition are fostered in the plant as a part of the regular safety program, the nurse should be familiar with the relative standings of various groups and should use her ingenuity in keeping the men interested in this competition.

Because she is constantly making contact with so many different individuals, the nurse should be thoroughly conversant with general company policies, and more particularly with those having to do with medical treatment, compensation, and insurance. She is then in a position to answer employees' questions intelligently.

ANOTHER way in which employee interest in safety can be aroused is by showing the new employee through the hospital, pointing out various pieces of equipment, and explaining briefly their purposes. The nurse should also briefly explain the set-up of the medical department and the safety department, and the close relationship between the two, mentioning the methods used and the part the employee will be expected to play in helping the whole to function smoothly and efficiently.

The nurse can gain confidence and good will by familiarizing herself with the general layout of the plant, its principal operations, the manufacturing methods employed, and the products manufactured. She should have a working knowledge of the more important and hazardous pieces of equipment, the processes used, and the hazards involved, so that she may be able to talk the language of those who seek her assistance. To acquire this knowledge the nurse, accompanied by the superintendent, safety director, or company doctor, might well pay an occasional visit to each of the various departments of the plant, making a contact with the foremen or operators and asking questions.

When appropriate, both while going through the plant and when treating injured employees in the first aid room, the nurse may inquire whether advantage is being taken of the various safety devices provided, such as goggles, safety shoes, respirators, and protective aprons. By knowing the plant, its processes and products, she can call the employees' attention to the importance of using the different safeguards.

First aid classes for employees conducted by the nurse also stimulate an interest in safety.

Some experienced safety men are of the opinion that the plant nurse should serve on the plant safety committee, or at least that she should attend committee meetings. It is contended that in this manner she serves as an advocate of the injured worker's point of view during an accident analysis. It has also been suggested that because she may be better qualified to keep records than the others, she should serve as secretary of the committee. Regardless of the merit of these suggestions, it is agreed that the nurse should be kept closely informed of the activities of the safety committee, so that she may be able to discuss them intelligently with employees coming to her.

The nurse's influence may be extended to the community life of the town in which the plant is located, depending upon her willingness to participate in community activities, such as parent-teacher associations, community safety councils, and safety groups in the public schools.

If there is a plant publication, the nurse might prepare occasional articles dealing with safety and health. She should keep posted also on the latest developments in industrial nursing practices by reading nursing magazines and other literature on the subject. She should attend nurses' meetings whenever possible, as well as state and national safety congresses, thus keeping in touch with what others are doing in her field and getting a broader vision of her work and its possibilities.

In conclusion, the good industrial nurse should constantly bear in mind that she is engaged in the tremendously important task of "selling" good will. To be successful in this undertaking she must first interpret her work to those with whom she comes in contact. This is no easy task, but one not impossible of accomplishment provided she has the personality, the technical training, and the determination necessary for her work.

Industrial Eye Hazards

TO SECURE wider distribution of its book on "Eye Hazards in Industrial Occupations", by Louis Resnick and Lewis H. Carris, the National Society for the Prevention of Blindness is now offering copies at the special price of 50 cents each as long as the supply lasts. This book, which sold formerly at the actual cost price of $1.50, was published in 1924. Although some of the photographs show safety devices which have since been improved upon, the contents remain a valuable guide to safe practices in industry.

"Eye Hazards in Industrial Occupations" is a handbook for safety engineers, safety inspectors, safety

committeemen, industrial physicians and nurses; for those responsible for industrial operations, whether owners, managers, or members of the operating staff; for governmental officials, trade association executives, and social agency officers; and for the many others who share the responsibilities and opportunities for conserving the life, health and sight of the millions of men, women and children employed in industry.

The volume contains 247 pages, and includes 59 illustrations dealing with the safeguarding of eyesight in factories, mines, shops and offices. Orders or inquiries should be addressed to the National Society for the Prevention of Blindness, 50 West 50th Street, New York City.

Diagnostic Features of Silicosis and Silico-Tuberculosis

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IT IS generally recognized today that silicosis is the most common and, from the standpoint of medical interest, the most important of the hazardous forms of pneumoconiosis.* It is also well known that the hazards of silicosis in effect upon the death rate in pulmonary tuberculosis are very high. Silicosis has the tendency to produce increased susceptibility to pulmonary infections and particularly to tuberculosis. Latent tuberculous foci or the childhood type of tuberculosis may become reactivated by silicotic changes, or a pre-existing silicotic process may become complicated by a superimposed tuberculous condition through external infection with tubercle bacilli.

PATHOLOGICAL CHANGES IN SILICOSIS: Silicosis develops by breathing air which contains very fine particles of silicon dioxide dust, also known as free silica or quartz. The microscopic silica dust which is capable of producing pathological changes in the parenchyma of the lungs is only two to five microns in diameter; the dust particles which are more than 10 microns in size are usually harmless. The inhaled dust, when lodged in the alveoli of the lungs, is first carried into the lymphatic circulation by the phagocytes. Thus, the dust becomes deposited in the tracheobronchial lymph glands producing there pathological changes first. But when the inhalation of dust continues, supersaturating the lymphatic system, then as the next step, the phagocytes deposit their dust particles in the cells of the lungs. The presence of foreign particles in the lung tissue stimulates a protective reaction resulting in the formation of thick fibrous tissue walls around the dust particles. In this manner silicotic nodules are formed. They are from one to six mm. in diameter. The nodules progressively increase in size. When there is a conglomeration of nodules localized in a certain portion of the lungs, there occurs a coalescence of the nodules into larger silicotic areas. Thus, silicosis is a progressive disease. Nodulation and formation of new fibrous tissue continues in the victim even after the exposure to dust has ceased. The damage produced in the lungs is permanent. It was formerly believed that the pathological changes in the parenchyma of the lungs were due to the mechanical action of the sharp dust particles. At present most authorities agree that the chemical action of silicon dioxide stimulates fibrotic changes. Silicon dioxide, which is slightly soluble in the alkaline body fluids, produces toxins which are supposed to initiate fibrosis and nodular formation. The process is always bilateral, occuring simultaneously in both lungs. The length of the process varies from several months to 20 years.

Where silicosis and tuberculosis coexist, the pathology in the lungs corresponds to the changes produced by both diseases. Nodulations and connective tissue fibrosis are scattered within and about tuberculous infiltrations, forming massive areas of chronic disease. Chronic adhesive pleurisy is a frequent complication. The occurrence of cavities and caseation is infrequent. Again, some other types may present a somewhat different picture, characterized mainly by perinodular tuberculous processes. The silicotic nodules may become caseous, being surrounded by exudative tuberculous infiltrations. In silicosis, complicated by tuberculosis, it may be said generally, that the pathological changes correspond to the type of tuberculosis present.

GENERAL DIAGNOSTIC CONSIDERATIONS: There are no specific signs or symptoms in silicosis or silico-tuberculosis that are not found in other pulmonary diseases. Shortness of breath and disability are the main symptoms. For diagnostic purposes the disease is sometimes divided into three stages. In the first stage the symptoms are not very marked, except possibly for some shortness of breath. There is no disability at first. As the disease progresses, the respiration becomes gradually more and more affected. Then the most characteristic symptom is marked dyspnea. The breathing is labored and disability also sets in gradually. But later, a chronic cough may develop; the lung capacity for breathing decreases; weakness progresses and finally complete disability occurs. In this final stage, the victim is likely to develop tuberculosis which becomes fatal. Deaths from uncomplicated, single silicosis are infrequent. The physical signs are of no help in differentiating the disease from other pulmonary conditions which might be present. But a physical examination is of greatest importance because, in the first place it leads to the determination of the presence of some pathology in the lungs, and then it aids in determining the presence of some type of infection complicating silicosis. In difficult borderline cases, the physical examination proves especially valuable. Again, a physical examination alone is absolutely insufficient for establishing the diagnosis. For this purpose, a most carefully obtained history and an x-ray examination become absolutely indispensable. For the diagnosis of tuberculosis super-imposing silicosis, sputum examinations are required.

HISTORY: In determining the presence of silicosis, a good history is the most essential factor. The history must be very complete, covering not only the type of work done, but also the length of time spent in a certain occupation. In taking the history it is of great importance to ask the individual about all occupations in a chronological order, from the day the victim left school and became involved in gainful work until the onset of the present disease in question. The purpose of this procedure is to discover whether an individual who recently had a dustless occupation might not have been exposed to inhalation of silica dust sometime during his life. Silicosis is a progressive disease and it may be traced to a dusty occupation many years back in the past. The fact that somebody discontinued many years ago a dusty occupation, does not eliminate silicosis. The disease is permanent and the progress of the disease continues even when exposure to silica dust has been discontinued for many years. On the other hand, not being directly involved in a dusty occupation does not eliminate the chances of acquiring silicosis. Working close to a place from which fine silica dust may be blown in many directions for a distance of many feet, creates a potential environment of exposure. Besides mining and quarrying there are many other industries where silica hazards exist, such as: foundries, potteries, glass factories, paint factories using silica, and occupations such as grinding, sand-blasting, etc. The concentration of silica dust varies in different industries. The concentration of silica dust determines the extent of pathology and the length of time necessary to produce silicotic changes in the lungs. The higher the concentration of the silica dust the less time will be required to produce bad effects, and the extent of pathological changes will be greater. The length of exposure required varies, therefore, with the different occupa-

* In *Diseases of the Chest*, January, 1938.

tions in various industries. Among foundry workers the risk of acquiring silicosis is comparatively lower than in many other industries and the time of exposure, therefore, would be longer. But occupations which involve a high concentration of fine silica dust cause a rapid progress of the disease, and silicosis may occur in as short a time as a few months. Therefore, the details of the type of occupation in a certain industry and the length of time of exposure must be necessarily included in the history.

X-RAY DIAGNOSIS: Equally important as the history is the x-ray examination. It is superfluous to say that the x-ray plates must be taken by an expert and read by an experienced radiologist. For the purpose of diagnosing silicosis or silico-tuberculosis, the best possible films are required, showing the minutest structural changes in the lungs. Improper exposures may not reveal the most desirable and most characteristic features, thus increasing the difficulties in obtaining a definite diagnosis. The silicotic nodulations on the x-ray plate appear as well-defined shadows about 6 mm. or less in size of uniform density. They are distributed bilaterally, with somewhat lesser distribution in the lower portions of the lungs. When there is coalescence of nodules, localized in certain areas of the lungs, there appear conglomerate shadows on the x-ray film. Silicosis may simulate many other lung conditions such as miliary tuberculosis, fungi infections, etc. By taking a series of x-ray exposures usually other diseases may be eliminated. In order to obtain a better idea of the distribution of silicotic nodulations, stereoscopic plates are recommended. Some authorities believe that stereoscopic plates and a series of x-ray exposures are essential requirements for diagnosis. When silicosis is complicated with tuberculosis, the reading of x-ray films becomes essentially more complicated. Cavities may be seen only in far-advanced cases.

SPUTUM EXAMINATIONS: In order to be able to determine whether silicosis is complicated with some type of lung infections and in particular with tuberculosis, repeated sputum examinations are of primary importance. Routine sputum examinations should be done in every case. When the sputum is negative for tuberculosis, animal inoculations of the material will sometimes prove of great help in establishing the diagnosis.

CONCLUSION: 1. Silicosis is a permanent and progressive disease, characterized by nodular formations and fibrosis in the lungs.

2. Silicosis has the tendency to increase susceptibility to pulmonary tuberculosis.

3. Shortness of breath on exertion, cough and lowered lung capacity are the common symptoms in silicosis.

4. The physical examination is extremely valuable but alone is insufficient for establishing the diagnosis.

5. The history is of primary importance, but it must be complete and exhaustive with special reference to the type of occupation in the silica dust environment and the length of time of exposure.

6. Perfect x-ray plates are indispensable. They must be interpreted by an expert radiologist. The distribution of silicotic nodules is bilateral.

7. Routine sputum examinations are required.

Traumatic Surgery

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THE rapid development of industry in general and the increasing incidence of automobile accidents have given the subject of traumatic surgery an added importance everywhere. An additional factor is the frequency of injuries in sports and in the home, for next to those occurring in industry the greatest number of minor accidents occur in the home.

Industrial accidents handled through workmen's compensation comprise a major portion of traumatic work and emphasize its importance, because the cost of insurance is based upon the amounts paid out for medical care and disability payments. This factor places definite responsibilities on:

FIRST: The employee, to report immediately any injury which has the possibility of becoming serious. These should include extensive abrasions, deep lacerations, puncture wounds, sprains severe enough to cause continued pain and all more extensive injuries. Delay may mean the difference between a simple or complicated wound.

SECOND: The employer, to select for his work surgeons equipped, qualified and sufficiently interested in that type of work to render an injured employee the same service given under similar circumstances to a private patient. Minor injuries of all sorts are likely to require considerable time and study and usually come to the doctor during busy office hours. Nevertheless immediate and careful treatment is imperative if complications are to be avoided.

THIRD: The doctor, to handle each case with proper care and consideration, striving toward a good anatomical and functional result within the shortest possible time. In industrial work this has an important bearing on the economic factor involving both the wage earner and the employer.

It is the purpose of this paper to discuss minor injuries, or those seen in the office and emergency room of the hospital, for the reason that very little stress is laid upon such cases in our literature and scientific meetings. It is hoped also to inspire better treatment in these cases by calling attention to some of the most common errors and by offering a few suggestions on treatment of the kind of cases most frequently seen.

Some Common Errors

THE first thought in treating puncture wounds usually is the danger and prevention of tetanus. Important as this is it often takes undue precedence over the prevention of infection in the local wound. It is too frequently the practice to dash a little iodine on the external wound, put on a dressing, give 1.500 units antitetanic serum and discharge the patient. Most of these wounds are in the feet, due to nail punctures and potentially infected, and such treatment has no more value than the old-fashioned "fat meat" poultice. The writer has seen a number of cases of secondary infection following such careless methods.

Lacerated wounds are often closed by taking a few stitches hurriedly through all layers. This is a vicious practice, especially when the wound is irregular in outline, or has beveled edges, or maceration of the tissues. Such technique would not be dreamed of in closing an operative wound, and there is no reason for it in the accidental wound. In the absence of infection the wound would heal, but crushed tissues do not heal by first intention and only a wide, ugly and sometimes painful scar is to be expected.

Poor preparation of the accidental wound with improper debridement of devitalized tissues before repair is one of the principal causes of slow or poor healing, because such devitalized tissues make excellent culture media for pathogenic bacteria which retard the natural processes.

Tightly tied sutures are always uncalled for. Stitches have no direct part in the healing process except to hold the edges in approximation so the proper organization of blood and lymph elements can take place. This is often forgotten in the haste of closing wounds, and when the postoperative swelling occurs the sutures may be found cutting through the skin. Also it must be remembered that it is not always possible to determine the actual extent of tissue damage at the time of the accident.

Except rarely, the secondary repair of tendons is made necessary by a lack of proper diagnosis at the time of injury, and is most often

* Read before the Sixty-fourth Annual Meeting of the Florida Medical Association, held in St. Petersburg, April 5, 6 and 7, 1937; published in *J. Florida M. A.*, January, 1938.

seen in deep cuts about the hand and wrist, where the tendons are very elusive when severed. It is most important in these injuries to test the functions of fingers and wrist before repairing the wound. The diagnosis is sometimes difficult and may require considerable time and patience due to the tendency of long tendons to retract. It often becomes necessary to enlarge the original wound in order to locate tendon ends, and by no means should a wound be closed until the tendon ends are located and sutured.

The minor accidental wounds should be followed to the point of complete healing the same as any other, for in no other way can the surgeon observe the progress of the case and know that the end result is what was to be desired. A partially healed wound is a source of danger from delayed hemorrhage, late development of infection and other complications. Satisfactory treatment includes personal supervision until the patient can be discharged as cured.

Painful manipulation during suture of a wound or reduction of a minor fracture may destroy the confidence of the patient and lose his valuable cooperation in handling the case. Local anesthesia should be used to insure the proper degree of comfort to the patient and establish confidence and respect toward the surgeon. It will enable one to do a better job and also prevent a tendency towards hasty or careless treatment.

Suggestions for Treatment

FOR treating nail puncture wounds radical treatment applied to all cases gives best results, and is used as follows:

The foot, or other part, is cleansed with soap and water and benzene, or ether and alcohol, and is then painted with tincture of iodine or merthiolate, following which clean or sterile towels (when available) are draped about the wound. The skin and subcutaneous tissues are infiltrated with novocaine, requiring one or two cubic centimeters. Then an incision is made about one-fourth to one-half inch long, to expose the nail tract and allow removal of foreign particles, and in deep or very dirty wounds this is to be followed by irrigation with normal saline or peroxide of hydrogen. Tincture of iodine is then applied directly into the enlarged wound on a sterile cotton pledget, the pledget removed and a small wick of narrow iodoform gauze packed lightly into the wound. A dressing of 10% ichthyol ointment is applied and the patient given 1,500 units of tetanus antitoxin except in cases where it is refused. The dressing is antiseptic and astringent. At the first subsequent dressing in 24 to 48 hours the wick is removed and the wound usually found clean and dry and not productive of pain. In a large number of the smaller wounds the patient can be discharged with instructions to remove the dressing in 48 hours when the wound is found completely healed.

In the past three years this treatment was used in 88 cases, which required a total number of 164 subsequent dressings, an average of a little less than two for each case. There were only two cases of secondary infection in the series; none of tetanus.

The proper treatment of accidental incised wounds is thorough preparation, antisepsis and anatomic approximation of the tissues. If the incision has been at an acute angle leaving thin beveled edges firmer union and better scar are attained by first cutting away the "bevel" on each surface to convert the edges into vertical ones, due to the fact that these bevel edges have little blood supply left. The procedure in such cases will depend upon the location and extent of the wound, and if this trimming is not found to be practical then the sutures should be placed farther away from the skin edges than is customary and tied loosely to prevent crawling, and a snug bandage applied. For small wounds of this type narrow adhesive strips are often preferred to suture. In the incised wounds diagnosis must be complete, for it is this type of wound that occurs so frequently about the hand and wrist due to windshield glass, shoemaker tools, oyster knives, etc., and is so often associated with damaged tendons.

Repair of lacerated wounds entails good preparation of the wound and adjacent tissues, removal of all loose particles by mechanical means and debridement of devitalized tissues, especially in scalp wounds. Unless this is carefully done infective organisms are almost certain to invade the tissues. Where a wide discussection of devitalized tissue is necessary, undermining the skin on each side will aid in effecting a closure but should be avoided unless not to do so would produce undue strain on the skin sutures. For the small wounds of this type it is often possible to excise it completely. Antitetanic serum is indicated.

Gunshot wounds are occasionally seen in emergency room practice as minor injuries. Bullets near the surface, in a joint, or in or near a vital organ should be removed. Infected bullet wounds are to be laid open for drainage, but the greater number need no probing and only routine treatment of the local wound, with special attention to treatment of shock and the prevention of tetanus and gas-gangrene. The important step in the minor wounds is the administration of combined antitoxin and the necessity for its being repeated when later an attempt is made to remove bullets or to repair ununited bone, though it may be months after the original injury.

First-degree burns respond to unguentine, butesin-picrate or tannic-acid ointment in the early stage of treatment. When the blisters burst and the skin can be removed zinc-oxide is an excellent dressing. The *Journal of the American Medical Association*, June, 1917, described a paraffin ointment that is an excellent impervious dressing for first-degree burns.

After establishment of drainage the small infected wound will respond readily to daily cleansing, removal of slough with sterile forceps, application of non-irritating antiseptic and a dressing of boric-acid ointment. The more extensive and spreading infections which demand more active treatment in the form of drains, etc., are not considered here because of lack of time.

One troublesome problem of a minor nature that is very commonly seen is the indolent or trophic ulcer following infected abrasions or scratches or direct blows over a superficial bone such as the tibia. These hard, crater-like ulcers have a stubbornly chronic tendency and respond very poorly to treatment by astringents and ointments. A little zinc-oxide ointment covered by a thick gauze pad and strapped down forcibly directly over the sore with an elastic adhesive will remove the rubber-like ulcer bed and promote healing more quickly than usual treatment with ointments alone.

The most common sprain is that of the ankle, the result of sudden inversion of the foot. This causes stretching or tearing of the various ligaments, most commonly the lateral. On the whole this lesion is poorly treated, due in part to the fact that so many times it receives only "home" treatments in the form of hot soaks and partly because of the lack of appreciation of the actual pathology. Severe sprains are best treated by complete fixation as soon as possible. When delay is unavoidable the foot and leg should be elevated, with the patient at rest in bed, and ice-bags or cold wet compresses applied. If the case is seen before swelling has appeared, or is only slight, immediate strapping of the ankle with the foot in neutral position is proper. Two or two and one-half inch lateral strips are applied on both sides of leg to prevent inversion and eversion, and are reinforced by circular straps arranged solidly from the metatarsal arch to about four inches above the ankle leaving out the heel and lower part of the tendo achillis. This will minimize swelling, and if much swelling is anticipated, it may be augmented by a cloth bandage over the adhesive from the toes to the knee; the cloth bandage may be removed the next day. Thorough strapping will immobilize the ankle completely except for slight flexion and extension and the patient can be allowed up on his feet. In cases of an excessive amount of early swelling or enough skin damage to prevent strapping, immobilization should be secured by immediately applying a cast.

Sprains at the wrist are less frequent and usually less severe than at the ankle; however, the same principle applies to both locations, namely, adequate fixation for sufficient length of time to allow the damaged ligaments to heal. The most troublesome complication of sprains at the wrist is tenosynovitis which results from inadequate fixation for too short a period of time. The value of x-ray examination of all severe sprains cannot be overemphasized. Many of these injuries are in reality a sprain-fracture, or at the wrist prove to be a carpal fracture, neither of which can be diagnosed properly without the aid of x-rays.

Those fractures usually treated in the office are fingers and toes, Colles' fracture, and fractures of the metacarpal bones. Nowadays most fractures of the clavicle are seen first at the hospital where the patient has been sent as an emergency for x-ray before the doctor is called. Such cases are all easily handled under local anesthesia by the individual surgeon's choice of methods. Longitudinal or incomplete fractures of the phalanges or metacarpals are often associated with lacerated or contused wounds about the hands and may be easily overlooked if the importance of x-ray in all suspicious cases is not realized. Lack of time does not permit detailed discussion of these injuries.

Conclusions and Summary

THE growing importance of minor surgery is stressed.

2. Attention is called to careless methods of handling simple injuries and their resultant complications.

3. Minor accidents come in at unusual hours, day or night, but proper treatment is immediate treatment and must not be spared.

4. Proper treatment of mild injuries will lessen complications and thereby prevent disability, minimize disability and return the patient to regular duties in the shortest possible time; an important economic consideration in industrial cases.

5. Suggestions for treatment of some of the injuries most commonly seen are offered.

Discussion:

DR. WALTER C. JONES, JR., Miami: I first would like to state that I think DR. NETTO has very carefully and conservatively covered this subject in the time allotted to him. I feel that the physician in industrial surgery plays a dual role. He not only acts as the protector of a patient's welfare but as well, he must consider the welfare of the industry. No man should attempt to do industrial surgery unless he is willing to assume the responsibility of those patients on the same basis as his own private individual cases.

Nothing plays a greater part in the protection of both parties than early reports. These things may be of little consequence materially so far as the individual is concerned but later may entail considerable expense on the part of the company and considerable disability on the part of the patient himself. A simple lesion or wound of a finger can be most embarrassing to the physician in charge of the case later.

Tetanus faces us all and carries with it a certain amount of danger, especially if we fail to carry out the proper prophylaxis. We all recognize this in the severe lesions associated with extensive contusion where it is not possible to completely eradicate the source of infection.

I cannot emphasize too strongly the need for debridement in handling industrial cases. This should be most radically done; all devitalized tissues should be removed.

DR. LLOYD J. NETTO, West Palm Beach (Concluding): I should like to thank first of all those who took part in the discussion for their generous attitude. I do feel that it is a very important subject not properly stressed in our meetings. The paper was written with regard to minor injuries of all kinds. Naturally, the industrial work enters into it for that is the source of most of these cases. However, it was not written entirely from the standpoint of industrial work; it is important in cases from all sources.

As for the matter of records, that has been discussed already. I intended to mention it in the paper, but time was not sufficient to mention the importance of keeping records of both the private and compensation patients. In private cases, it is most desirable to have records. Most automobile accident records come into court. In industrial cases, it is imperative. In one case we had an old man who fell from a scaffold and had a fracture. He was treated by accepted methods but had about one-half inch of shortening, when the leg healed. I mentioned something about this and he said, "Don't worry; I have had three-fourths of an inch all my life." Such a record is invaluable.

In a good many cases of the extensive lacerated wounds, contusions, etc., you need only to leave the site open, allowing them to heal by second intention. Most of the discussers have brought out the fact that proper cleansing and debridement eliminate the necessity for the use of antiseptics. Under those circumstances, antiseptics are not necessary.

General anesthesia was not mentioned. I wanted to mention ethyl chloride spray only to condemn it. I do not use evipal in office practice very often because of the fact that occasionally you will find a patient who will sleep several hours instead of the customary 45 minutes. I do use it in the emergency room services or for short operations in the hospital.

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